The Metals REVIEW

OWNED AND PUBLISHED BY THE MEMBERS OF THE AMERICAN SOCIETY FOR METALS

THE MONTHLY SURVEY AND DIGEST OF WHAT'S NEW IN METALS

Volume XVIII AUGUST, 1945 Number 8

MELLON INSTITUTE LIBRARY
SEP 12 1945
PITTSBURGH, PA.

Parker Demonstrates How Rate of Loading Affects Metal Behavior

Reported by O. Cutler Shepard
Stanford University

Earl Parker, who has been engaged in metallurgical war research at the University of California, discussed "The Behavior of Metals Under Rapidly Applied Loads" at the May 21st meeting of the Golden Gate Chapter in San Francisco.

To show that rate of loading can influence the behavior of materials, Mr. Parker demonstrated a piece of the silicone known as "bouncing putty." This material deformed like chewing gum when slowly stretched, broke in a brittle manner when rapidly stretched, and bounced like a rubber ball when thrown on the table.

Mr. Parker then described the method of recording elastic waves in metals by means of strain gages and an oscillograph. He showed oscillograms giving the time-strain relation at various positions on bars of metal after one end of the bar had been struck by a bullet. Elastic waves traveled through the bar and were reflected back and forth from each end. The great complexity of strains developed by reflection in irregularly shaped pieces of metals was pointed out. The rate of travel of the elastic waves was said to be 17,000 ft. per sec.

A commercial machine for mechanically pulling tensile specimens at various rates up to 300 ft. per sec. was described. This machine suddenly hooks one end of the tensile specimen to a revolving flywheel. Mr. Parker showed slides of typical stress-strain curves at various rates of loading. With rapid loading, he found higher yield strength, higher ultimate strength, and greater ductility. The energy absorption of a notched specimen of cold rolled steel, however, decreased sharply with increased rate of loading up to 20 ft. per sec. Faster rates of loading gave a scattering in energy absorption but indicated little further drop.

Mr. Parker then described experiments with rapidly applied loads to single crystals of copper. These single crystals deformed by slip on the usual sets of slip planes and pulled out to a chisel edge as one would expect. Copper pulled to failure at high rates was stronger than copper pulled to failure at ordinary testing machine rates.

Mr. Parker believes that rapid loading causes slip on a greater number of planes and hence results in greater ductility. The greater amount of slip work-hardens the metal to a greater extent and hence it is harder and stronger. The difference in appearance of slip bands on single crystals of copper, when produced at different rates of loading, was shown with slides of photomicrographs and electron micrographs.

New Officers and Appointments Announced by Vanadium-Alloys

At a recent meeting of the board of directors of the Vanadium-Alloys Steel Co., Roy C. McKenna was elected president, replacing Floyd Rose, resigned. He will continue in his present capacity as chairman of the board.

R. B. George was elected sales vice-president, L. D. Bowman, production vice-president, and F. P. Underwood, vice-president and secretary.

J. P. Gill, vice-president, was appointed chairman of a newly formed executive committee which includes F. P. Underwood, R. B. George, L. D. Bowman, and Alexander Nimick. J. Cleveland McKenna was elected a director to fill the unexpired term of Floyd Rose.

Later appointments of the Vanadium-Alloys Steel Co. include: Lawrence Wood, advertising manager and member of the sales committee; W. R. Mau, member of the sales committee; Henry Hudson, Boston manager; Ridgway Cook, Springfield (Mass.) manager; Frank Moberg, works manager of Latrobe plant; Harry Good, works manager of Anchor Drawn Steel Co., George A. Roberts, chief metallurgist; and Harry G. Johnstin, metallurgical engineer.

Elected President of Adel

William A. DeRidder, past chairman of the Los Angeles Chapter ASM and publicity director of the Western Metal Congress and Exposition held in Los Angeles in 1941, has been elected president and general manager of Adel Precision Products Corp., Burbank, Calif.

Mr. DeRidder has been a director of Adel since 1943. In 1920 he joined predecessor companies of General Metals Corp., Vernon, Calif., becoming president in 1937, a position which he will retain. Both Adel and General Metals are owned by Transamerica Corp.

Film on Die Manufacture Released

Titled "The Manufacture of Dies," a new Allegheny Ludlum Steel Corp. 16-mm. sound and color film, running time ten minutes, is available for use upon request. It describes the manufacture of lamination dies from high carbon, high chromium die steel. Address requests to Allegheny Ludlum Steel Corp., Brackenridge, Pa.

What's NEW . . . . . in THE METALS REVIEW

Review of Current Metal Literature

Analysis 7
Cleaning and Finishing 3, 5
Corrosion 3
Design 17
Electroplating 5
Foundry Practice 9-10
Furnaces and Fuels 10
Heat Treatment 11
Industrial Uses and Applications 14, 17
Inspection and Standardization 9
Joining 13-14
Laboratory Apparatus, Instruments 7, 9
Lubrication and Friction 13
Machining and Machine Tools 12-13
Materials Index 2
Miscellaneous 17
New Books 17
Ores and Raw Materials 2
Powder Metallurgy 3
Properties of Metals and Alloys 2
Refractories and Furnace Materials 10
Salvage and Secondary Metals 10
Smelting and Refining 2
Statistics 17
Structure 2
Temperature Measurement and Control 9
Testing 7
Welding 13-14
Working (Rolling, Forging, etc.) 12

Other Departments

Review of Products, Equipment, Materials 15, 18, 19
Review of Manufacturers' Catalogs 20
Employment Bureau 16
Reader Service Coupon 15
Advertising Index 20

PASS-A-ROUND

	Name	Item No.
Many executives in your plant will want to see this record of what happened last month in the metal industry. Just fill in the names, note items for special attention — and Pass-A-Round.		

Technical Papers Preprinted Despite Show Postponement

Postponement of the National Metal Congress and Exposition for 1945 has not affected the preparation of the technical program usually presented by the American Society for Metals during the week of the Congress, according to W. H. Eisenman, secretary of ASM and managing director of the Congress and Exposition.

Scores of excellent technical papers on many phases of the metal industry have been received and are being prepared for presentation. They will be preprinted as usual and copies will be available to members upon request if ordered before Sept. 15. The list of preprinted papers appears on page 6 of this issue, together with an order form.

Program Ready on Short Notice

As a result, the technical program of the Metal Congress will be ready on very short notice. "While there is a definite need at this time for a Congress and Exposition, the ASM is bending its efforts to cooperate in the present war era when transportation and hotel facilities are so sorely required by our government," Mr. Eisenman said.

"As a service to ASM members and to the metal industry as a whole, we are watching developments closely so that the Society may be ready on short notice to go ahead with the 1945 Congress and Exposition. As soon as the green light flashes in Washington for large meetings of this type, your society will be ready with an announcement of this 1945 event.

"As matters stand today," Mr. Eisenman continued, "ASM would be in a position to go ahead with a Metal Show on short notice if war conditions permit. Comments from members and from former exhibitors emphasize the need for a meeting that would be devoted to conversion problems.

Annual Business Meeting Nov. 2

"With some civilian production already under way, a careful study of war-developed metals, alloys and metal forms, and of new equipment and processes is the first order of the day," Mr. Eisenman pointed out. "While much of this development may be studied by other means, no one has yet produced a more efficient and thorough method of first-hand examination than that introduced more than a quarter-century ago by the National Metal Congress and Exposition."

Mr. Eisenman predicted that the next Metal Show will, on the basis of interest at this time, be the largest in the history of this event. Hotel and auditorium facilities in several cities are being studied carefully and an announcement of the site of the next meeting will be forthcoming as soon as definite plans can be formulated.

In the meantime, the annual ASM business meeting and election of national officers are being scheduled in cooperation with the regular session of the Cleveland Chapter on Nov. 2.

Quality Control Program Moves To Carnegie Tech in Pittsburgh

The Quality Control Program of the Office of Production Research and Development WPB has been moved from Washington to Pittsburgh and is now located at Carnegie Institute of Technology. The staff, consisting of Holbrook Working, Edwin G. Olds, and Paul Peach, has been transferred to Pittsburgh and will continue the policy of service to industry.

Several interesting reports are being prepared under the new program, and the policy of assisting with instructional help for intensive eight-day courses will be continued. Since the beginning of the program in 1942 about 1,800 persons have attended one or more of the 31 intensive courses so far given. In many instances permanent quality control societies have been established in various locations.

A.S.M. REVIEW OF CURRENT METAL LITERATURE

An Annotated Survey of Engineering, Scientific and Industrial Journals and Books Here and Abroad, Received in the Library of Battelle Memorial Institute, Columbus, Ohio, During the Past Month. Prepared by Thelma Reinberg, Librarian.

1. ORES & RAW MATERIALS

Production; Mining; Beneficiation

1-28. **Raw Material in Post-War Planning.** W. G. Mochrie. *Foundry Trade Journal*, v. 76, May 24, '45, pp. 73-74.

Melting virgin metals; scrap metal; utilization of ingots; influence of current practice on future supply; light alloys.

1-29. **The Treatment of Gold Ores.** F. B. Michell. *Mine & Quarry Engineering*, v. 10, June '45, pp. 139-144.

Introduction, general principles, grinding gold ores, plate amalgamation, amalgamation of concentrates, application and practice of flotation, cyanidation and precipitation, treatment of simple or free-milling ores, placers, and simple sulphide ores. 20 ref.

1-30. **Metallurgical Tests of Sheep Tanks Ore.** Edwin Walter Mills. *Mining Journal*, v. 29, July 15, '45, pp. 5-6.

Possibility of low-cost production of manganese and manganese products from the Sheep Tanks mine is indicated by recent metallurgical tests which show that the manganese content of the ore can be recovered as a commercial byproduct when the ore is leached by either the dithionate process or the sulphur dioxide process.

1-31. **Modern Treatment of Manganese.** A. G. Arend. *Chemical Age*, v. 52, June 2, '45, pp. 485-487.

Wet extraction and deposition.

2. SMELTING AND REFINING

2-78. **The Improvement of the Citric-Acid Solubility of Basic Open-Hearth Slags Containing Fluorspar.** T. F. Pearson. Iron & Steel Institute, Advance copy, May '45, 13 pp.

Brief mention is made of the citric-acid solubility test for basic slags. A survey of the order of solubility for slags from both fixed and tilting furnaces when fluorspar is used follows. Tapping-slags were found to be 10 to 20% soluble for fixed furnaces and 20 to 30% soluble for a tilting furnace with current practice. Severity of the quench appeared to influence the results. Further work in the laboratory involved the sintering of powdered low-solubility slags with sodium carbonate and other sodium compounds. 4 ref.

2-79. **"Kish—Excess Carbon."** M. L. Carl. *Pig Iron Rough Notes*, no. 99, Spring-Summer, '45, pp. 23-25.

Amount of carbon an iron can hold in solution at a given temperature is dependent upon the amounts of other elements present, particularly silicon. High silicon iron can hold less carbon in solution at a given temperature than a low silicon iron at the same temperature. Addition of steel or alloys to the charge of molten iron changes balance almost in proportion to the amounts added.

2-80. **Clean Steel.** *British Steelmaker*, v. 11, June '45, pp. 261-266.

Test to show the influence of non-metallics will not be a good one because: (1) The influence of non-metallics cannot be separated from other concurrent influences, and (2) it is not possible to take a sample.

2-81. **Trial Run Is Made at Sponge Iron Plant.** *Steel*, v. 116, June 25, '45, pp. 122-123, 166, 170.

Experimental ore reduction unit sponsored by War Production Board and located at Warren, Ohio, plant of the Republic Steel Corp., produces 400 tons of product. History, description and status of project.

2-82. **Hydrogen Content of Electrolytic Manganese and Its Removal.** E. V. Potter, E. T. Hayes and H. C. Lukens. *Metals Technology*, v. 12, June '45, T.P. 1809, 9 pp.

Investigation to determine amount of hydrogen or other gases in typical commercial electrolytic manganese sheet and to investigate ways of removing it most conveniently. 4 ref.

2-83. **Metal Recovery by Anion Exchange.** Sidney Sussman, Frederick C. Nachod and William Wood. *Industrial & Engineering Chemistry* (Industrial Edition), v. 37, July '45, pp. 618-624.

Anion exchange for recovery of metals which form complex anions. Satisfactory absorption and recovery have been demonstrated with chromium, gold, iron, molybdenum, palladium, platinum, and vanadium, using different types of complex anions. A more extensive study was made of chromium recovery. The anion exchange mechanism of the adsorption was demonstrated. Adsorption on different anion exchanger salts and from several influents was carried out. Best results were obtained with adsorption from a neutral chromate solution on the anion exchanger chloride. 29 ref.

3. PROPERTIES OF METALS AND ALLOYS

3-113. **The Anodic Behaviour of Metals, I.—Platinum.** A. Hickling. *Transactions of the Faraday Society*, v. 41, June '45, pp. 333-339.

Initial build-up of anodic polarization at a smooth platinum anode over a wide range of conditions investigated by a new oscillographic method. Three main stages in the polarization have been distinguished corresponding to the ionization of hydrogen, the charging of a double layer, and the deposition of oxygen at the electrode.

3-114. **Role of Molybdenum and Associated Alloys in Cast Iron.** Joseph C. Kinsella. *Canadian Metals & Metallurgical Industries*, v. 8, June '45, pp. 35-37.

Attempts to build up an understanding of the actual function of a few of the commonly used alloying elements, and how they alter the properties of ordinary cast iron so profoundly. Effect of copper, chromium, molybdenum, vanadium.

Materials Index

THE FOLLOWING tabulation classifies the articles annotated in the A.S.M. Review of Current Metal Literature according to the metal or alloy concerned. The articles are designated by section and number. The section number appears in bold face type and the number of the article in light face.

General Ferrous

2-78-80-81; **3**-126; **4**-49; **5**-27; **7**-150; **10**-53; **16**-77-81-86; **18**-159; **26**-102.

Cast Iron

3-114; **9**-87; **14**-211-215; **18**-150-154; **20**-292; **22**-380; **23**-157-162.

Cast Steel

12-147; **15**-25; **20**-250.

Wrought Carbon Steel

4-42; **6**-84; **7**-138; **10**-51-53; **19**-202-205-212; **22**-381-386-394.

Alloy Steel

2-79; **3**-124-125; **4**-42; **6**-80; **10**-49; **18**-168; **23**-163-174-181; **26**-113.

Stainless and Heat Resisting Steel

3-120; **7**-155-159; **12**-136; **18**-156-161; **23**-179.

Tool Steels and Carbides

8-87; **14**-206; **19**-195; **25**-70.

Ferro-Alloys

3-122; **10**-52.

General Non-Ferrous

2-83; **22**-384; **26**-111.

Aluminum

3-117-119-120; **4**-44; **6**-86; **7**-143; **9**-88; **10**-50; **14**-196-199-204-205-209-213-214-219; **15**-23; **16**-78; **18**-152-160-162-164-167-176; **19**-197-203-205-213-214; **20**-282-292; **22**-372-373-377-383-385-391; **23**-156-158-159-160-161-168-169-171-172-180; **26**-110-114.

Magnesium

4-48; **6**-79; **9**-84-88; **10**-59; **14**-202-208-213-214-218-219; **18**-158-173; **19**-204; **20**-267-282; **22**-391; **23**-158-159-169-170-171-173; **24**-58; **25**-73-80; **26**-105-110-114.

Copper, Brass and Bronze

3-115-120-128; **4**-43-44-45-47; **6**-81; **10**-50-60-62; **14**-196-204; **19**-205; **22**-386; **26**-108-109.

Nickel and Nickel Alloys

3-120; **8**-95; **10**-61; **26**-112.

Lead and Lead Alloys

3-120; **6**-78; **10**-55; **19**-205; **21**-56; **23**-155; **26**-109.

Tin and Tin Alloys

8-91; **21**-56; **23**-160; **26**-107.

Zinc and Zinc Alloys

7-135; **8**-88-89; **14**-194; **16**-79; **20**-296; **26**-108-109.

Miscellaneous and Minor Metals

1-29; **3**-113-118-121; **4**-46; **10**-54; **21**-58; **26**-107.

3-115. **A White High-Manganese Brass.** R. S. Dean, J. R. Long, T. R. Graham, and C. W. Matthews. *Metals Technology*, v. 12, June '45, T.P. 1813, 9 pp.

Study of an alloy having the composition of 70% copper, 20% manganese, and 10% zinc. This alloy remained single-phase throughout the working and annealing cycles of the preliminary tests and appeared to be about the strongest of the white single-phase alloys. The project included an investigation of additional alloys, deviating from this composition by 5% of each of the three components to evaluate the effects of variation in composition; also a study of the properties of the central alloy made with silicothermic manganese.

3-116. **Austenitic Weld-Metal.** K. Winterton. *Welding*, v. 13. June '45, pp. 206-209.

Physical properties of an austenitic weld-metal and its structural transformation on straining. 3 ref.

3-117. **The Possibilities of Light Alloys in Industry.** A. Russell. *Machinery* (London), v. 66, May 24, '45, pp. 565-567.

Wrought aluminum alloys are available in three types: Alloys that need no heat treatment to give the maximum strength; alloys of the type which need solution treatment, i.e., heating to about 500° C. for a given time and quenching in water; alloys which need both solution and precipitation treatments before reaching their maximum strength.

3-118. **Indium.** William S. Murray. *Modern Metals*, v. 1, July '45, pp. 6-9.

Broad outline on indium presented as a result of numerous requests relative to specific data about this metal. In addition, plating light metals with indium for surface protection, hardening and decorative finishes, is a future possibility and may be worth investigating.

3-119. **The Strength Characteristics of Alclad Sheet.** I. G. Bowen. *Sheet Metal Industries*, v. 21, June '45, pp. 992-994, 1000.

Devoted to the characteristics of the commonly used light alloy Alclad sheet to specification DTD 390 and two aspects of the material are discussed. Correlation between proof stress and ultimate stress is examined. Secondly, similar examination of elongation and ultimate stress is made. Material used to provide the data was drawn at random from the stocks of various manufacturers and the thicknesses of the sheets varied from 10 to 24 s.w.g.

3-120. **Metals for Service at Sub-Zero Temperatures.** Paul Beal Petty. *Chemical & Metallurgical Engineering*, v. 52, June '45, pp. 102-103.

Examines the sub-zero behavior of Al, Cu, Ni, Pb and their alloys and stainless steel; there are several which qualify as structural materials for low temperature processes.

3-121. **Minor Metals.** A. R. Powell. *Metal Industry*, v. 66, June 29, '45, pp. 406-408.

Thorium; titanium; zirconium; tantalum; niobium. In this survey of the minor metals is the employment of tantalum tube and sheet for service under severe corrosion conditions, and the suggestion that even this metal may eventually be replaced by niobium.

3-122. **Low Carbon Ferro-Titanium.** *Vancoram Review*, v. 4, Spring '45, pp. 10, 21.

Increasing use for titanium in both its customary roles; modifying the condition of oxygen and nitrogen (or their compounds) and imparting desirable properties to alloyed irons and steels for special uses.

3-123. **Manganese-Vanadium Steel.** *Vancoram Review*, v. 4, Spring '45, pp. 11-12.

Combination of physical properties and workability provides an answer to many problems of modern boiler construction.

3-124. **Effect of Grainal Treatment on Steel Made to Specification NE 9440.** *Vancoram Review*, v. 4, Spring '45, pp. 14-15, 17.

Effect of the addition of Grainal on the Jominy hardenability, tensile properties, and impact strength (including tests at low temperature) of a steel made to NE specification 9440.

3-125. **Graphitization of Steel.** H. J. Kerr and F. Eberle. *Iron & Steel*, v. 18, June '45, pp. 186-188.

Investigations on low carbon and low carbon molybdenum types; creep test; arc welded intermediate C-Mo steel.

3-126. **Hipersil—a Greatly Improved Transformer Iron.** T. D. Yensen. *Journal of Applied Physics*, v. 16, July '45, pp. 379-385.

Hipersil is a silicon-iron alloy that, by a combination of hot and cold rolling processes, followed by a refining annealing process has reached such superior magnetic properties, as to cause as great improvements in present day transformer iron as were obtained at the time of the introduction of silicon iron. Hipersil has cut the losses to ¼ of those of Hadfield's alloy, with ten times the maximum permeability.

3-127. **Techniques for Evaporation of Metals.** Leonard O. Olsen, Charles S. Smith and E. C. Crittenden. *Journal of Applied Physics*, v. 16, July '45, pp. 425-434.

Thirty-four elements observed for evaporation behavior, the results summarized for each element and the best techniques then listed.

3-128. **Beryllium Copper.** L. Sanderson. *Aircraft Production*, v. 7, June '45, pp. 287-288.

Survey of the treatment and properties of a useful spring material.

3-129. **Solidification of Metals.** Harry A. Schwartz. American Foundrymen's Association, Third Annual Foundation Lecture Publication No. 45-1, 78 pp.

Most of the problems connected with the solidification of metal, both in the abstract sense and in the sense of making solid castings, can be solved by the application of classic principles of physics. The existing difficulties arise out of the experimental handicaps in determining some of the constants involved, and out of the mathematical difficulty incident to evolving solutions corresponding to the rather complex cases occurring in the most ordinary foundry practice. What is really the most fundamental engineering problem in the foundry industry—the making of castings—has been almost neglected. 38 ref.

4. STRUCTURE

Metallography and Constitution

4-41. **The Solubility of Hydrogen in Zirconium and Zirconium-Oxygen Solid Solutions.** M. N. A. Hall, S. L. H. Martin and A. L. G. Rees. *Transactions of the Faraday Society*, v. 41, June '45, pp. 306-316.

Study of the solubility of hydrogen in zirconium and in zirconium containing oxygen in solid solution to the extent of 50 atom % made isothermally over a range of temperatures up to 1000° C. and at pressures up to 1 atmosphere, rigid precautions being taken for the elimination of surface contamination of the metal by oxide or nitride films.

4-42. **Structural Changes in Carbon and Molybdenum Steels During Prolonged Heating at 900 to 1100° F., as Affected by Deoxidation Practice.** G. V. Smith, R. F. Miller and C. O. Tarr. American Society for Testing Materials, Preprint 19a, 1945, 18 pp.

Annealed and normalized samples of steels—three with 0.1% carbon, and six with 0.1 to 0.2% carbon and 0.5% molybdenum—of different deoxidation practice were tested at 900, 1000, and 1100° F. for periods up to 5000 hr., and then subjected to hardness tests and to metallographic examination for microstructural changes. 24 ref.

4-43. Textures, Anisotropy and Earing Behavior of Brass. F. H. Wilson and R. M. Brick. *Metals Technology*, v. 12, June '45, T.P. 1803, 27 pp.

Survey of the recrystallization textures of brass as affected by annealing temperatures and prior reductions, and an account of the earing behavior which accompanies these textures. Also new data on the anisotropy that accompanies a characteristic texture for brass and endeavors to establish the factors that account for the difference in earing behavior between copper and brass. 13 ref.

4-44. Internal Friction of Single Crystals of Brass, Copper and Aluminum. George H. Found. *Metals Technology*, v. 12, June '45, T.P. 1804, 19 pp.

Investigation is concerned with the internal friction of single crystals of aluminum, brass and copper. Further demonstrates the use of damping measurements as a research tool for fundamental metallurgical studies. 14 ref.

4-45. A Study of Age-Hardening Using the Electron Microscope and Formvar Replicas. D. Harker and M. J. Murphy. *Metals Technology*, v. 12, June '45, T.P. 1811, 16 pp.

Results obtained on an alloy of 2% beryllium in copper and one of 20% molybdenum in iron described and technique used in preparing the replicas. 6 ref.

4-46. The Constitution of the Gold-Germanium System. Robert I. Jaffee, Eugene M. Smith, and Bruce W. Gonser. *Metals Technology*, v. 12, June '45, T.P. 1812, 7 pp.

Composition and melting point of the Au-Ge eutectic reported by Einecke found to be substantially correct. Eutectic composition has been placed at 12.0% germanium. Liquidus curves and the solid solubility of germanium in gold have been determined, and are shown. 5 ref.

4-47. The Alpha Solid Solution Field of the Copper-Manganese-Zinc System. R. S. Dean, T. R. Graham and A. H. Roberson. *Metals Technology*, v. 12, June '45, T.P. 1836, 12 pp.

Using high-purity alloys, composition limits of the alpha field of the copper-manganese-zinc system have been determined for temperatures ranging from 800 to 1500° F. at intervals of 100° F. The field is bounded on two sides by the copper-zinc and copper-manganese binary systems, and by the alpha-beta and the alpha plus X fields on the other two sides. The alpha-beta boundary of the field remains approximately parallel to 60% copper up to 10% manganese and then curves toward the manganese corner with higher manganese contents. 10 ref.

4-48. The Solubility of Manganese in Liquid Magnesium. N. Tiner. *Metals Technology*, v. 12, June '45, T. P. 1891, 7 pp.

Investigation to determine accurately the liquid solubility of manganese and its variation with temperature. Solubility of manganese in liquid magnesium is limited and depends on temperature. Alloy additions, such as zinc or aluminum, decrease the solubility of manganese in magnesium. 7 ref.

4-49. Formation and Structure of Iron Oxide Films. *Iron Age*, v. 156, July 19, '45, pp. 65, 138.

Use of X-ray reflection to throw light on the formation and crystal structure of iron oxide films reveals that this film is made up of three layers, FeO, Fe_3O_4 and Fe_2O_3. Also discusses the crystal structure of nickel and cobalt oxides. (Translation from Russian *Journal of Technical Physics*, no. 14, 1944, pp. 132-161.)

5. POWDER METALLURGY

5-26. Sintered Metals. R. Kieffer and W. Hotop. *Metal Industry*, v. 66, June 8, '45, pp. 354-356.

Comparison of properties with equivalent fused materials. 7 ref.

5-27. Effects of Pressure and Temperature on Iron Powder Compacts. Charles O. Heath, Jr. and Joseph D. Stetkewicz. *Metal Progress*, v. 48, July '45, pp. 73-76.

Procedure consists of pressing a measured quantity of iron powder in a die under pressure up to 50 or 60 tons per sq. in. Green compact formed has a highly polished surface and considerable surface hardness, but lacks the strength necessary for use as a finished piece, so it is fired in a furnace with a neutral or reducing atmosphere. This temperature promotes sintering of the particles at contacting areas and results of greater strength, density, and toughness.

5-28. The Explosibility of Metal-Powder Dust Clouds. Irving Hartmann and H. P. Greenwald. *Mining & Metallurgy*, v. 26, July '45, pp. 331-335.

Many metal dusts offer dangerous but little-known hazards. Safety measures recommended.

5-29. Powdered Metals Have Wide Application. *Petroleum World*, v. 42, June '45, pp. 49-51.

Porosity, strength and self-lubrication are the highly useful combination of qualities that are built into powdered metals.

5-30. Powder Metallurgy Affords Various Advantages. Raymond B. Aufmuth. *SAE Journal*, v. 53, July '45, pp. 44-45.

Methods of production and advantages of metal powders.

6. CORROSION

6-78. The Corrosion-Fatigue Properties of Some Hard Lead Alloys in Sulphuric Acid. David J. Mack. American Society for Testing Materials, Preprint no. 32, 1945, 22 pp.

Fatigue properties of pure lead, tellurium lead, 1% antimonial lead and commercial storage battery lead were determined on a rotating beam machine of the cantilever type at 1785 rpm. in air, in 38% sulphuric acid, and in air after the specimens had been previously corroded in sulphuric acid while stress free. It was concluded that the corrosion-fatigue resistance of these alloys in sulphuric acid is a running balance between fatigue strength and corrosion resistance. 30 ref.

6-79. Cathodic Protection. L. H. Woodman. *Scientific American*, v. 173, July '45, pp. 44-46.

Pipelines and other underground metallic structures are constantly subject to corrosion caused by galvanic currents. Control of such corrosion can be obtained by the use of buried anodes which set up counter potentials. Masses of magnesium offer a ready solution.

6-80. A Theory of the Mechanism of Rusting of Low Alloy Steels in the Atmosphere. H. R. Copson. American Society for Testing Materials, Preprint no. 25, 1945, 27 pp.

Analyses of selected rust samples presented, along with an examination of weather data and some weight losses. These results led to a new theory of the mechanism of rusting. In industrial atmospheres, copper and nickel in steel render sulphate corrosion products more insoluble by forming complex basic sulphates. On mild steel, sulphates in the rust are relatively soluble and promote corrosion but are washed away by rain. On alloy steels the sulphates are less soluble so that corrosion is slower, but less sulphate is washed away and more accumulates in the rust. The percentage of sulphate in the rust increases as weight loss decreases. At the marine location, severe corrosion of certain edges was due to soluble chlorides being swept to these edges by the wash of rain.

6-81. What About Copper in Boilers? Richard C. Corey. *Combustion*, v. 16, June '45, pp. 43-46.

Occurrence of copper deposits in high-pressure boilers and diverse opinions as to its possible detrimental effects; reviews the chemistry involved. No valid evidence has yet been produced to show that metallic copper, or copper oxide deposits, will cause corrosion.

6-82. Electrical Methods of Water Treatment. *Power Plant Engineering*, v. 49, July '45, pp. 80-81.

Use of zinc bars or balls in boilers to reduce corrosion. Use of direct current with boiler as anode. Ozone, electro-osmotic system of purification; ultraviolet radiation; use of silver in water sterilization; present-day cathodic protection methods.

6-83. The Corrosion of Food Cans. W. B. Adam and D. Dickinson. *Sheet Metal Industries*, v. 21, June '45, pp. 1009-1010.

Diagnostic methods. 3 ref.

6-84. Theory of Stress Corrosion Cracking of Mild Steel in Nitrate Solutions. J. T. Waber, H. J. McDonald and B. Longtin. Electrochemical Society, Preprint 87-32, pp. 439-461.

Stress corrosion cracking of mild steel in nitrate solutions is shown to depend upon the stress-accelerated age hardening of the steel. A correlation between the cracking times and the extent of aging was made. Both the extent of aging after a standard treatment and the rate of cracking after several heat treatments were correlated with the free nitrogen factor. 60 ref.

6-85. How Metals Behave in Sea Air. *Heating & Ventilating*, v. 42, July '45, pp. 83-84.

Specimens of various metals and alloys exposed to the salt water atmosphere at Kure Beach to determine th ability of the metals and coatings to resist sea air corrosion.

6-86. Resistance of Clad 24S Aluminum Alloys. *Automotive Industries*, v. 93, July 1, '45, p. 29.

Results of tests during which clad 24S, aged and unaged, was exposed to a salt spray solution for 500 hr. and to an accelerated corrosion media containing salt and H_2O_2 for a 48-hr. period indicate that the yield and ultimate strengths of both types were not affected by either of the corrosive solutions. The elongation of both materials was reduced approximately 2% by the above applicable specifications.

6-87. Corrosion Research Project at Kure Beach Test Station. Harry W. Stenerson. *Chemical and Engineering News*, v. 23, July 10, '45, pp. 1160-1163.

At Kure Beach, long-term research is going on in metal corrosion in sea water from chemical action, galvanic current, and from marine organisms such as the Teredo. Many alloys and protective finishes are being tested under exacting conditions.

6-88. A Commentary on Corrosion Testing. *Corrosion & Material Protection*, v. 2, June '45, pp. 19-20, 17.

Considers the possible procedures in corrosion testing program.

6-89. Rust Preventives in the Production Cycle. D. W. Prichard. *Products Finishing*, v. 9, July '45, pp. 44-46, 48, 50, 52.

Places where corrosion is most apt to develop are where the metal surface of the part is left "chemically clean" and devoid of any protective oil film; after grinding or machining with water soluble coolants; after machining, tapping or threading operations with bases of the sulphur-chlor type having a definite staining action upon steel alloys; and after tumbling parts with granite chips in an aqueous alkaline solution for the purpose of "breaking" sharp corners or removing heat treating or quenching scales.

7. CLEANING AND FINISHING

7-135. Facts and Figures on Zinc Spraying. *Steel*, v. 116, June 25, '45, p. 132.

Thickness of the sprayed zinc determines the corrosion resistant potential of the surface so protected. Cost studies.

7-136. Evaluating Surface Finishes. *Steel*, v. 116, June 25, '45, pp. 142, 144, 176.

Accurate and rapid method of determining type and quality of surface finish of metals utilizes clear plastic film which "flows" over surfaces. Replica then is stripped and surface examined by passing it through narrow beam of light to register irregularities on photo-electric cell. 2 ref.

7-137. Infra-Red in Industry. William Miskella. *Sheet Metal Worker*, v. 36, June '45, pp. 45-46, 54.

Paints which have been baked for one hour in a convection oven are now processed in an infra-red oven in 6 min. Instead of an oil bath for expanding bearings for assembly on shafts, they may be placed under the infra-red heat for a few minutes and will be expanded sufficiently to slip over the shaft in question. They are used for drying, processing, and heating in many ways, in temperatures from room to 600° F.

7-138. Surface Preparation of Structural Steel—a Review. George Diehlman. *Paint and Varnish Production Manager*, v. 25, June '45, pp. 152-154, 156, 158-160.

Review of the work published in the *Official Digest*, in papers presented at Federation meetings, and articles in other publications.

7-139. Crosley's Setups for Painting War Products. Frank B. Knight. *Industrial Finishing*, v. 21, June '45, pp. 38-42, 44, 46, 48, 50.

Conveyorized spray painting, dip coating, electrochemical treatment, fungus-resistant lacquering, silk-screen stenciling, chemical dyeing and iridite treatment, for protectively coating war products.

(Continued on page 5)

IT MAY SEEM LITTLE BUT, IT'S OH SO BIG!

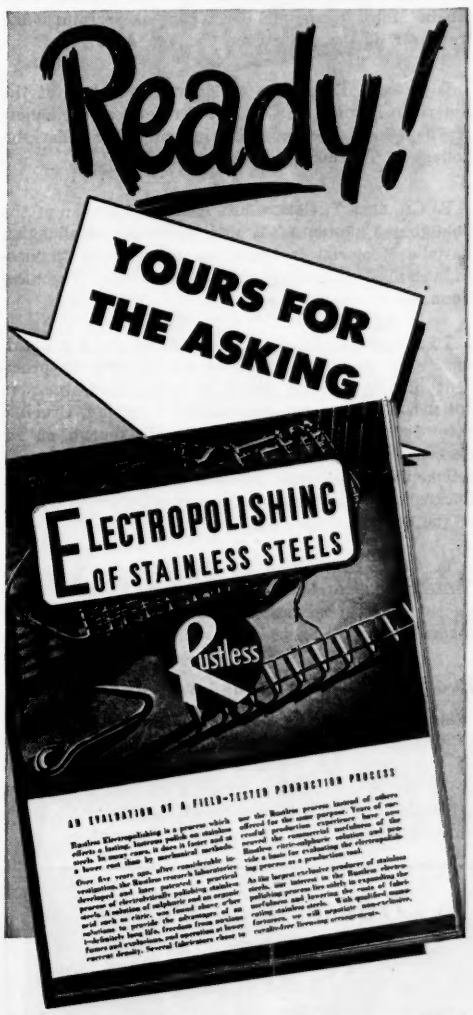
The success story of the little acorn and the big oak tree is familiar to all. This same story could be applied to MacDERMID INCORPORATED compounds for cleaning metals!

Over twenty years ago MacDERMID INCORPORATED conceived the idea of individually formulated cleaning compounds for specific metals, alloys, products, and processes. Today these compounds—ANODEX—METEX—SOLVMAX—DYCLENE—METALEX—are nationally recognized by many leading manufacturers to be the fastest, most positive, and most economical formulations available. Write for free data sheets on the compound developed for your particular problem.

MAC DERMID
INCORPORATED
WATERBURY 88, CONNECTICUT
WRITE ONE OF THESE SERVICE ORGANIZATIONS FOR FREE DEMONSTRATION

NEW YORK — Udylite Corp. (L. I. City)
DETROIT — Udylite Corp. Wagner Srvs.
CHICAGO — Udylite Corp. Gen. A. Burt Mfg. Co.
CLEVELAND — Udylite Corp. McGean Chem. Co.
ST. LOUIS — Udylite Incorporated
TORONTO—CAN. — Clark Industrial Supplies Co.

Mention R-148 When Writing or Using Reader Service.



This 8-page folder gives the basic facts about the electropolishing of stainless steels by the Rustless method. Lists products, advantages, and describes the process, which is simple, easy to operate, and economical. If you make stainless products that are difficult to polish by conventional methods (wire forms are an example) Rustless electropolishing may be the perfect solution of the difficulty. Write for "Electropolishing of Stainless Steels." It will be sent you free. Please use your business letterhead.

SALES OFFICES:
BALTIMORE • BOSTON • BUFFALO • CHICAGO
CINCINNATI • CLEVELAND • DETROIT
LOS ANGELES • MILWAUKEE • NEW YORK
PHILADELPHIA • PITTSBURGH • ST. LOUIS
DISTRIBUTORS IN PRINCIPAL CITIES

Rustless

Producing STAINLESS STEELS *Exclusively*
RUSTLESS IRON AND STEEL CORPORATION
BALTIMORE 13, MARYLAND

Mention R-149 When Writing or Using Reader Service.

The Metals REVIEW
THE MONTHLY SURVEY AND DIGEST OF WHAT'S NEW IN METALS

Published by the
American Society for Metals
7301 Euclid Ave., Cleveland (3), O.

KENT R. VAN HORN, *President*
C. H. HERTY, JR., *Vice-President*
WILLIAM H. EISENMAN, *Secretary*
HARRY D. McKINNEY, *Treasurer*

Trustees
R. W. SCHLUMPF A. L. BOEGEHOLD
L. S. BERGEN A. E. FOCKE
MARCUS A. GROSSMANN, *Past President*

Subscriptions one dollar a year. Entered as Second Class Matter, July 26, 1930, at the Post Office at Cleveland, Ohio, under the Act of March 3, 1879.

Ray T. Bayless.....*Editor*
M. R. Hyslop.....*Managing Editor*

Cleveland, Ohio—August, 1945
Volume XVIII Number 8

Compliments

To ERNEST G. GUENTHER, who on August 1 completed 25 years as chemist and metallurgist for Wisconsin Motor Corp. and ten years as secretary and treasurer of the Milwaukee Chapter ASM.

- * -

To JOSEPH B. ENNIS, senior vice-president of the American Locomotive Co., on the receipt of the honorary degree of Doctor of Engineering from Clarkson College of Technology, Potsdam, N. Y.

- * -

To CHARLES T. GREENIDGE, 1944-45 chairman of the Columbus Chapter ASM and research metallurgist, Battelle Memorial Institute, on his selection as vice-chairman of the newly formed Columbus Technical Council.

- * -

To J. A. DEBONDY, superintendent of melting, Manitoba Steel Foundries, Ltd., on his selection as president of the Electric Metal Makers Guild, Inc.; to JOHN E. ARTHUR, superintendent of melting, Crucible Steel Co. of America, Park Works, Pittsburgh, on his election as vice-president; and to D. L. CLARK, superintendent of melting, Simonds Saw and Steel Co., Lockport, N. Y., on his election as secretary-treasurer of the Guild.

- * -

To C. K. KENYON of Sheffield Steel Corp. and C. CHILSON of Pratt & Whitney Aircraft Corp. on their election as representatives of the ASM on the newly formed Technical Societies Council of Kansas City.

Peoria Executive Joins Graham-Paige

M. D. Johnson has resigned as chief inspector at Caterpillar Tractor Co. to join the staff of the director of manufacturing, Graham-Paige Motors Corp., Detroit. Mr. Johnson is a member of the Executive Committee of the Peoria Chapter ASM and of the Society's national Constitution and By-Laws Committee.

Transactions Wanted!

The following issues of TRANSACTIONS and METAL PROGRESS are needed by the National Office of the American Society for Metals to fill out its records:

Transactions
Volume 2, 1921—December issue
Volume 3, 1923—March and June
Volume 8, 1925—October
Volume 21, 1933—April, June, July, September, December
Volume 22, 1934—May, July, December
Volume 24, 1936—March and June
Volume 25, 1937—September
Volume 26, 1938—March
Volume 30, 1942—September

Metal Progress
Volume 47, 1945—March, April, May

Any surplus copies of these issues that are not filling a needed purpose would be gladly received. Send the journals or address your inquiry to the American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.

Sub-Zero Transformation, Bend Test, and Ship Welding Covered in Three 20-Minute Talks

Reported by Horace Ross
Henry Disston & Sons, Inc.

Boston Chapter ASM tried an innovation for its meeting on May 4, when three 20-minute talks were given by younger members of the Chapter who have been doing outstanding jobs in the war effort.

Stewart G. Fletcher, research associate at Massachusetts Institute of Technology, spoke first on "Sub-Zero Transformation in Tool Steel." He dealt with high speed and other high alloy tool steels, as well as with some carburizing steels. It appeared that the sub-zero treatment is useful for promoting dimensional stability, and in certain cases for increasing hardness. Dr. Fletcher advised using the treatment promptly after hardening for maximum benefit.

D. M. Van Winkle, associate physicist, Watertown Arsenal, then spoke on "The Significance of the Bend Test," discussing a novel use of the bend test in the calculation of the strength of various steels.

Lloyd W. Pote, welding engineer, Boston Navy Yard Materials Laboratory, was the final speaker. Discussing "Building of Welded Ships," he outlined the various kinds of welds used in different locations. He also described the progress of a particular hull day by day from the laying of the keel until practical completion.

The pressing need for ships has resulted in the prefabrication of large sections of the ship at a distance from the ways, and their incorporation into the hull was shown. The talk was well illustrated by many slides exemplifying the construction step by step.

E. F. Tibbets, engineer, central technical department, Bethlehem Steel Co., Shipbuilding Division, was technical chairman, and handled the schedule of three talks with appropriate despatch. Much credit is due the speakers for success in the difficult job of condensing their remarks to the 20-minute limit.

Boston Young Men's Night Speakers: (standing) D. M. Van Winkle at left and S. G. Fletcher; (seated) L. W. Pote and Technical Chairman E. F. Tibbets.

Named ASM Advertising Manager

A. P. Ford has been appointed advertising manager of the American Society for Metals, and of all publications including METAL PROGRESS, THE METALS REVIEW, *The Buyers' Guide and Data Book, The Metals Handbook, and the Metal Congress Program, it has been announced by W. H. Eisenman, national secretary of the Society. Mr. Ford has been with the Society for the past ten years and was previously western representative. He will continue to make his headquarters in Cleveland.*

Texas Chapter Holds Annual Barbecue

Reported by M. W. Williams
Hughes Tool Co.

Members of the Texas Chapter ASM went AWOL from their shops and laboratories on Saturday, June 23, to partake of their annual Texas style barbecue at the Sleepy Hollow Ranch of the Cook brothers. The Chapter offers its thanks to Carl and Cliff Cook for the generous way in which the ranch and all of its facilities was placed at the disposal of the members.

Swimming and horseshoe pitching, not to mention the aroma of barbecue cooking Texas style under tall pines, encouraged hearty appetites. Experts in the use of plastics when in cubical shapes were also in attendance and gave demonstrations. Bridge experts were even present and hours of their concentration did not create enough specifications to build a new bridge from the first to the second molar; however, a lot of old bridge work changed hands.

Those in attendance finally gathered, by persuasion, at the waters of the Sleepy Hollow pool and were promptly quenched in the final heat treatment.

X-Ray Inc. Names Morze Research Director

X-Ray Incorporated announces the appointment of Eugene W. Morze as its new research director beginning July 2. Mr. Morze was formerly associated with Gar Wood Industries where he was in charge of all metallurgical laboratories. Under Mr. Morze's supervision, X-Ray Incorporated will offer chemical and physical laboratory services to its customers, particularly in developing the uses of light alloys in the postwar industrial picture.

Many Factors Interrelated In Selection of Metals

Reported by L. C. Powell
Chief Metallurgist, Warner Automotive Parts Div., Borg-Warner Corp.

Illustrations of requirements for specific uses and proper selection of steels to fill these requirements formed the main body of a talk by O. W. McMullan of Bower Roller Bearing Co., before a recent meeting of the Ft. Wayne Chapter. Mr. McMullan's subject was "Some Factors in the Selection of Metals."

While the first consideration is usually economic, the cost of the finished article rather than the initial material cost should be calculated. Such properties as hardness, tensile and strength, shock or impact resistance, heat or corrosion resistance, and modulus of elasticity must be considered before an accurate and proper selection can be made.

Mr. McMullan chose carburizing steels to illustrate in greater detail the factors to be considered in the selection of a steel for a specific purpose. The speaker emphasized that the presence of impurities and other defects will greatly affect the properties of the steel. Whereas static strength increases directly with hardness up to a given point, toughness or shock resistance decreases with increased hardness beyond a certain point. The physical properties of a finished part are so dependent upon the relationship between case and core that it is necessary to know the size of the part and the type of stresses involved in order to select the carbon content most suitable to secure maximum mechanical properties.

Mr. McMullan concluded his address with a brief discussion on future trends in the selection of metals. Over a period of years the trend has been, and probably will continue to be, toward the production of more reliable materials, resulting in a reduced factor of safety and the production of smaller parts. Many choices of properties of the metal will still remain.

Fuller Placed in Charge of G.E.'s Schenectady Works Laboratory

Truman S. Fuller, for the past two years assistant engineering head of the works laboratory of General Electric Co., Schenectady, has been appointed engineer in charge of the works laboratory. Mr. Fuller has spent his entire career in engineering with General Electric and has seen 34 years of service with the firm. During this time, as a chemist and engineer, he has been granted 17 patents, most of which are on special alloys.

T. S. Fuller

Mr. Fuller was graduated from Syracuse University in 1911 with a B.S. degree in chemistry, and began his career with General Electric at the former Harrison Lamp Works in New Jersey. Three months later he came to the research laboratory in Schenectady as a metallurgist and remained in that capacity until 1938 when he was named engineer of materials and transferred to the works laboratory. In 1943 he became assistant engineer in charge of that division.

Metal Literature Review—*Continued*

7. CLEANING & FINISHING (*Cont.*)

7-140. **Luminous Paint.** Arthur H. Jackson. *Industrial Finishing*, v. 21, June '45, pp. 52, 54.
Notes on how to use luminous paint properly, preparation of surface to receive it, how to apply it, and what precautions to take to insure satisfaction.

7-141. **Bake Finishing Setup for New Motor Parts.** A. G. Trivision. *Industrial Finishing*, v. 21, June '45, pp. 56-61, 64, 66.
Well planned conveyorized setup for cleaning, dip coating and oven baking the parts of small motors and transformers; plus a parallel arrangement of equipment for impregnating electrical coils and baking impregnated coatings afterward.

7-142. **Conveyorized Setup for Painting M-38 Bombs.** G. L. Hehl. *Industrial Finishing*, v. 21, June '45, pp. 80, 82, 84, 86.
Shows how perfectly a well planned conveyorized setup takes care of cleaning all metal surfaces, applying protective coatings and quickly drying the paint on a two-coat production job.

7-143. **Anodic Treatment of Aluminum Gives Corrosion Resistance.** W. L. Maucher. *American Machinist*, v. 89, June 21, '45, pp. 105-107.
Effects of electrical treatment of aluminum increase corrosion resistance and, in some cases, surface hardness. Paint adhesion and appearance improved.

7-144. **Electrostatic Spraying of Porcelain Enamels, II.** James B. Willis. *Finish*, v. 2, July '45, pp. 21-24, 46.
Detailed report on an investigation of a new method of enamel application.

7-145. **Ford's Method of Preparing, Applying and Testing Synthetic Resin Enamels.** *Steel*, v. 117, July 2, '45, pp. 100, 151-152.
Enamels are for use on universal carriers, light armored cars, jeeps, trucks and other vehicles. Methods of paint application are controlled under Army Specifications, 60-0-1B, Painting Procedures. Ford has deviated from the specifications only by utilizing infrared ray lamps for drying instead of steam ovens, thus shortening drying time. By this method costs have been reduced.

7-146. **Electrolytic Polishing.** J. S. Crout. *Metal Industry*, v. 66, June 8, '45, pp. 357-359.
Decorative finishing; de-burring; de-scaling; machining. (From *Metal Progress.*)

7-147. **Black Finishes for Steel.** H. Silman. *Metal Industry*, v. 66, June 8, '45, pp. 362-363.
Operation of the phosphating process and the protection of the coating. Black nickel and molybdenum-nickel electrodeposits. 4 ref.

7-148. **Chromating Solutions.** G. E. Coates. *Metal Industry*, v. 66, June 8, '45, p. 364.
Analytical determination of dichromate and sulphate. 1 ref.

7-149. **Chemical Surface Treatments for Gear Teeth.** *Automotive Industries*, v. 93, July 1, '45, pp. 40, 102, 104, 106, 108, 110, 112.
Tests to determine the effectiveness of various chemical surface treatments as means to prevent or delay failure of gears by scuffing. Treatments to be investigated might include phosphate treatments of various types, a caustic soda-sulphur treatment, electrolytic tin plating, an anodic deposition of colloidal graphite, a nitric acid etch treatment.

7-150. **A Discussion of Pickling and Cleaning of Iron in Fused Salt Baths.** *Enamelist*, v. 22, June '45, pp. 8-10, 48-49.
Kolene and Tainton processes.

7-151. **The Successful Finishing of Electrically Insulated Wire and Cable.** Ralph C. Ellams. *Wire & Wire Products*, v. 20, July '45, pp. 485-489, 520-523.
Handling of the protective coating prior to application; mechanics of application; production problems and their solution.

7-152. **Sprayed-Metal Jig Members Speed Up Jet Plane Production.** Charles O. Herb. *Machinery*, v. 51, July '45, pp. 148-153.
Applies metal spraying to save time in constructing nest blocks for major jigs and fixtures.

7-153. **Die Castings Can Be Colorful, III.** *Die Casting*, v. 3, July '45, pp. 42-43.
Variety of colors, surface textures and protective properties available for die cast metals.

7-154. **Spray Setup of Polishing Wheels and Buffs.** *Iron Age*, v. 156, July 12, '45, pp. 55, 130.
Spraying of a mixture of cold glue and abrasive on buffs and polishing wheels to keep them cutting continuously is showing substantial production economies.

7-155. **Electropolishing of Stainless Steels.** *Iron Age*, v. 156, July 12, '45, pp. 64-66, 130.
Rustless Iron and Steel Corp. is promoting on a license-free basis a citric-sulphuric acid process described herewith, and stands ready to loan bench type apparatus for trial processing of postwar goods made of stainless steel.

7-156. **Chemical De-Scaling of a Modern Steam Generator.** M. E. Brines. *Power Plant Engineering*, v. 49, July '45, pp. 90-92, 99.
Details of two chemical treatments for cleaning a two-drum, D-type, 150,000-lb. per hr., 425-psi., 735° F. unit. Unit typical of many now operating; treatments illustrate progress in treating techniques; single tube experiments, made first, prove value of preliminary data before making actual treatment.

7-157. **Corrosion Proofed Metals.** *Plastics*, v. 3, July '45, pp. 98, 100, 140.
Extremely resistant to abrasion, shock, acid and base solutions, new plastics surface coating also withstands heat, applies easily.

7-158. **Electrostatic Spraying Applied to Porcelain Enameling.** James B. Willis. *Ceramic Industry*, v. 45, July '45, pp. 58, 60, 62-65.
Position of spray gun is of primary importance. Success of spraying operation depends largely upon preparation of enamel. Amount of over-spray may be reduced to as little as 15 or 20%.

7-159. **Electrolytic Polishing of Stainless Steel and Other Metals.** Otto Zmeskal. *Metal Finishing*, v. 43, July '45, pp. 280-286.
Paper primarily presents various solutions reported to be satisfactory for the polishing of stainless steel, and discusses some of the variables involved in obtaining a bright surface from anodic action. The literature contains information on useful electrolytes for other metals, and this information is collected in a supplementary table. 114 ref. (From *Metal Progress.*)

7-160. **Final Operations.—I.** G. Schlesinger. *Aircraft Production*, v. 7, June '45, pp. 266-273.
Requirements to obtain good quality surface finish; methods of measurement; a survey of finishing processes.

7-161. **The "Topograph" Surface-Finish Measuring Instrument.** *Engineering*, v. 159, June 1, '45, pp. 427-428.
Operates on a simple pneumatic principle and gives a pen record 10 in. long by 5 in. wide, on paper, in 3 min., the record being an enlarged profile of the surface irregularities along a selected straight line. On the graph traced by the pen the heights of the surface irregularities are directly ascertained in micro-inches by multiplication by the particular conversion factor for which the instrument is set. Irregularities of the order of 2 micro-inches are readily detected when the setting is for a magnification of 20,000 to 1.

7-162. **Surface Chemistry Declares War on Dirt.** Ray Sanders. *Products Finishing*, v. 9, July '45, pp. 54, 58, 60, 62, 64.
Wetting action; emulsifying action; saponifying action; colloidal action; solvent action; pH and cleaning; buffer index; total alkalinity or acidity; water conditioning.

8. ELECTROPLATING

8-87. **Chrome Plating Carbide Tipped Tools.** A. W. Ehlers. *Tool & Die Journal*, v. 11, June '45, pp. 98-100, 130.
Experiments with chrome plating of high speed tools indicate that specific applications such as taps, reamer and pilot bars, etc., do react favorably. Cyanide nitriding is, however, much more successful.

8-88. **The Fusion Brightening of Electrotinplate.** Howard T. Francis. *Frontier*, v. 8, June '45, pp. 6-7, 12.
Describes attempted experiments for the purpose of learning more about the several phenomena which occur during the few seconds in which the tin is in the liquid state.

8-89. **Specification Zinc Plating on Steel Sheets.** W. H. Safranek. *Monthly Review*, v. 32, June '45, pp. 567-578.
To maintain uniformity of plating, many factors influencing cathode efficiency were automatically controlled. Solution circulation was used as a means for maintaining uniform and constant concentration of solution. Automatic temperature control was used to operate motor valves regulating flow of water through cooling coils. Chemical additions were made on a continuous basis.

8-90. **Hard Chromium Plating.** J. J. Dale. *Monthly Review*, v. 32, June '45, pp. 581-594, 619.
Plating technique; operating characteristics of chromium plating baths; practical considerations; pre-treatments for various basis metals; use of hard chromium plate. 16 ref.

8-91. **Electroplating: Modern Equipment and Technique.** H. Silman. *Sheet Metal Industries*, v. 21, June '45, pp. 1031-1036.
Tinplating; the chloride bath; the stannate bath; anodes; caustic soda content; operation of the bath; the potassium stannate bath; the acid tin bath; acid tin sulphate bath; operating conditions; continuous electrotinning of steel strip; re-flowing procedure; relative merits of hot-dip and electrotinning.

8-92. **Stop-Off Devices Expedite Plating.** *Wings*, v. 4, July '45, p. 1651.
Application and removal of lacquers avoided and no drying is required, hence much time is saved. Quality is improved.

8-93. **The Electrodeposition of Element 43 and the Standard Potential of the Reaction Ma-MaO$_4$.** John F. Flagg and William E. Bleidner. *Journal of Chemical Physics*, v. 13, July '45, pp. 269-276.
Element may be obtained in an oxidized, anionic form by treatment with nitric and sulphuric acids.

8-94. **Indium Plating.** J. B. Mohler. *Metal Industry*, v. 66, June 22, '45, pp. 395-396.
Use of a high pH stabilized caustic-cyanide bath. 8 ref.

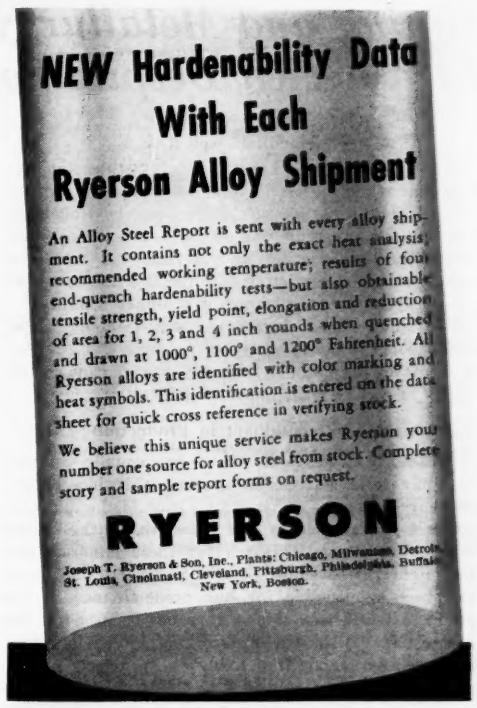
8-95. **The Repair of Worn or Over-machined Parts by Electrodeposition.** A. W. Hothersall. Institution of Mechanical Engineers *Journal*, v. 152, June '45, pp. 8-28.
Worn or over-machined parts may be restored to size by electrodeposition of nickel or chromium followed by machining or grinding to remove excess of deposit. Mechanical properties and the adhesion of these deposits are described with special reference to nickel. It is shown that strongly adherent nickel coatings can contribute appreciably to the tensile strength of the steel upon which they are deposited. Electrodeposited coatings may reduce the fatigue strength of steel and their use on parts subject to high alternating stresses should be made with caution. General notes on the process are given for the guidance of users.

8-96. **Reclaiming and Hardening of Engineering Components by Electrodeposition.** H. Merryweather. *Engineering*, v. 159, May 25, '45, pp. 419-420.
Chromium and nickel for electroplating.

8-97. **Plating of Die Castings on Full Automatic Conveyor.** H. A. Schoonover. *Metal Finishing*, v. 43, July '45, pp. 287, 305.
Description of conveyor and method employed.

Pearsall Promoted by Dravo Corp.

E. P. Pearsall, formerly editor-in-chief of employee publications at Wilmington, Del., has been made assistant advertising manager of the Dravo Corp., Neville Island, Pittsburgh.


NEW Hardenability Data
With Each
Ryerson Alloy Shipment
An Alloy Steel Report is sent with every alloy shipment. It contains not only the exact heat analysis, recommended working temperature, results of four end-quench hardenability tests—but also obtainable tensile strength, yield point, elongation and reduction of area for 1, 2, 3 and 4 inch rounds when quenched and drawn at 1000°, 1100° and 1200° Fahrenheit. All Ryerson alloys are identified with color marking and heat symbols. This identification is entered on the data sheet for quick cross reference in verifying stock.
We believe this unique service makes Ryerson your number one source for alloy steel from stock. Complete story and sample report forms on request.
RYERSON
Joseph T. Ryerson & Son, Inc., Plants: Chicago, Milwaukee, Detroit, St. Louis, Cincinnati, Cleveland, Pittsburgh, Philadelphia, Buffalo, New York, Boston.

Mention R-150 When Writing or Using Reader Service.

PARAGON
Springs
EXTENSION
TORSION
COMPRESSION
FLAT
FORMS
A Complete Spring Service
Coil springs, wire forms, flat springs, brazing rings, of all materials, in any quantity and in special designs are now available at Paragon.
A complete service not only in the manufacture of springs up to 2½ in. diameter bar, but in engineering and consultation on spring design, is yours for the asking. A special department has been set up for small orders—so don't hesitate to call on Paragon, whatever your spring requirements.
Now Available — An Interesting and Helpful Spring Design Booklet
PARAGON SPRING COMPANY
4615 WEST FULTON STREET, CHICAGO 44, ILLINOIS
Offices
Detroit Minneapolis Seattle

Mention R-151 When Writing or Using Reader Service.

Man-What a Hose Clamp!
NO GEARS • NO BOLTS
NO THUMB SCREWS
IT'S ALL
ONE PIECE
New Speed Clamp* Features
1. Exclusive, self-locking ratchet type design.
2. Lightest weight—lowest profile—sturdy spring steel construction.
3. Uniform circumferential pressure—no pinch or bind.
4. Faster and easier to install or remove.
Latch by hand
Lock with pliers
Remove with screw driver
Widely used throughout military aircraft. May be used over and over again. Sizes from ⅛" O.D. up. In writing for samples, please give outside diameter of hose with fitting inserted.
TINNERMAN PRODUCTS INC.
2024 FULTON ROAD • CLEVELAND 13, OHIO
In Canada: Wallace Barnes Co., Ltd., Hamilton, Ontario
In England: Simmonds Aerocessories, Ltd., London
*Trade Mark
Speed Nuts
SMARTEST THING IN FASTENINGS
Speed Clamps for hose connections are engineered and produced by the manufacturers of the famous SPEED NUT shown above.

Mention R-152 When Writing or Using Reader Service.

Mining and Metallurgy Have Bright Future In America Despite Some Gloomy Forecasts

Reported by R. Wayne Parcel
Metallurgist, Rio Grande Railroad

Those persons who have forecast the nearing exhaustion of American mineral resources are crying "Wolf." This was the thesis developed by Robert S. Palmer, managing director of the Western Economic and Mining Association, and secretary of the Colorado Mining Association, before the Denver section of the Rocky Mountain Chapter at a dinner meeting.

The speaker cited geological and economic arguments for the continuation of mining and refining at whatever pace industrial needs may demand, using American rather than imported minerals.

U. S. Predominant in Production

All the continents are more or less equally supplied with mineral resources, the speaker said, since nature played no favorites in her distribution of the different geological formations around the earth. In the United States, the energetic search for these minerals and the intelligent development of the properties so found has been responsible for our predominance in the production field, and this in turn has been one of the greatest single factors in our great industrialization and our high standard of living.

Many prominent men in both industry and government have made gloomy forecasts to the effect that the United States is exhausting her mineral resources at a rate which will soon result in virtual depletion, and consequent dependence both economically and militarily on outside sources. These men have based their predictions on what would seem a logical foundation—estimated reserves. Mr. Palmer showed the fallacy in these arguments from two directions.

The first is that the accepted policy of mining men is to block out reserves only a few years ahead; the second is that the quoted reserves mean those of a quality equal to the ones presently operated.

Low Grade Ores Abound

As an example, iron ores in present use run about 50%, and the supply of this grade of ore is rapidly diminishing. The little fact so glibly overlooked is that there is a supply of 40% ore in the Mesabi Range alone sufficient for 5000 to 7000 years consumption at present rates. In aluminum, there is a supply of 25 to 30% ore sufficient for many thousands of years, still unmined in the U. S. The economics of the particular metal involved may prohibit the lower grade ores from being used now, but the margin between profitable and unprofitable deposits is a narrow one, and depends on methods as well as need.

A further factor ignored by many is that methods of discovering minerals are improving, and also that many of our richer areas are as yet not fully explored. For example, less than 10% of the San Juan Valley has been explored, and even that 10% has not been explored in depth. When the needs are pressing, it will be only lack of talent and energy which can allow our resources to fail us.

The speaker concluded with the assertion that we should help other countries develop their resources, in order to promote world trade and business, but that we should not do this in a manner which permits our own industries to fall behind. The future of the mining and metallurgical industries in the United States depends as much on the foreign and domestic policies of the Federal government as it does on the price situation.

Carpenter Steel Appoints New Vice-Presidents

B. H. DeLong

P. B. Greenawald

At a recent meeting of the board of directors of the Carpenter Steel Co., Reading, Pa., Berton H. DeLong and Paul B. Greenawald were appointed directors and vice-presidents of the company. In his new post, Mr. DeLong will continue to supervise the research and development work of the company, and Mr. Greenawald will be in charge of mill production.

Mr. DeLong has been associated with Carpenter since 1910, holding the post of chief metallurgist since 1916. Before assuming his duties as general superintendent, Greenawald was metallurgical engineer for the company for 21 years.

Greenawald is a graduate of the Pennsylvania State College, a member of ASM, and is serving on the labor relations committee of the American Iron and Steel Institute. DeLong graduated from Cornell University. He is a member of the ASM, the American and British Iron and Steel Institutes, the American Society for Testing Materials, the Society of Automotive Engineers, as well as a Fellow of the American Association for the Advancement of Science.

Film Produced on Metal Honing

"Progressive Honing With Automatic Sizing" is the title of a new 18-min. sound motion picture produced for the Micromatic Hone Corp. by the Jam Handy Organization for free showings before interested groups in industry. The film shows developments in the honing of metals during wartime, the construction and operation of the new tool, operation of the microsize and hydrosize control, and explains multiple and progressive honing, and the adaptation of the honing process to mass production methods. Requests for showings should be addressed to the Micromatic Hone Corp., 8100 Schoolcraft Ave., Detroit.

Promoted by Timken Steel & Tube To Asst. General Superintendent

Gilbert Soler, superintendent of the quality control department at Steel & Tube Division of the Timken Roller Bearing Co., has been named assistant general superintendent of the Division.

Starting with the company in 1931 as a refractories engineer, Soler was made manager of research in 1934 and in 1937 was promoted to manager of research and mill metallurgy. In 1943 he became superintendent of quality. He is a graduate of Ohio State University where he was awarded an Experiment Station Fellowship for graduate work, leading to the Master of Science degree and the Professional Degree in Metallurgical Engineering. A holder of several patents, Soler has written 18 papers on steel processing, refractories and allied subjects.

G. Soler

He served as chairman of the Canton-Massillon Chapter of the American Society for Metals in 1940 and 1941 and of the Refractories Division of the American Ceramic Society in 1941. At present he is vice-chairman of the Iron and Steel Division Executive Committee of the AIME and is active on several committees of the National Research Council.

A. W. Sikes Now With Celotex Corp.

A. W. Sikes, a past chairman, Chicago Chapter ASM, has returned to the States and received his honorable discharge, after nearly five years of active duty in the U. S. and European theaters as lieutenant colonel with the Army Ground Forces. He is now product engineer in the Chicago headquarters of the Celotex Corp.

1945 ASM PREPRINT LIST

The papers listed below will be preprinted for distribution to members of the ASM in accordance with practice in previous years, although the Annual Convention at which they are usually presented has been postponed until the Government ban on large meetings is lifted. The Society will print only 10% in excess of the number of orders for preprints in the office on press date and this excess 10% will be sent out as long as it lasts, but the Society will assume no obligation of forwarding preprints after this 10% excess supply has been exhausted. Please order only those preprints in which you are immediately interested because all papers listed for presentation will be printed, together with discussion, in future Society publications. Order by number using the coupon below before Sept. 15, 1945.

1. **Anti-Reflection Films for Metallographic Objectives,** by James R. Benford, Bausch & Lomb Optical Co.
2. **The Partition of Molybdenum in Hypo-Eutectoid Iron-Carbon-Molybdenum Alloys,** by Fred E. Bowman, Climax Molybdenum Co.
3. **Stress Comparisons by Correlation With High Frequency Magnetic and Eddy Current Losses,** by P. E. Cavanagh, Allen B. DuMont Laboratories, Inc.
4. **The Effect of Variations in Composition and Heat Treatment on Some Properties of 4 to 6% Chromium Steel Containing Molybdenum and Titanium,** by George F. Comstock, Titanium Alloy Mfg. Co.
5. **Iron-Manganese Alloys—The Properties of Cold-Worked and Heat Treated Alloys Containing 1 to 7% Manganese,** by R. S. Dean, J. R. Long, T. R. Graham and R. G. Feustel, U. S. Bureau of Mines.
6. **Mass-Temperature Effects on Quenching 36% Cobalt Magnet Steel,** by Benjamin Falk, Simonds Saw & Steel Co.
7. **Drawability of Aluminum Alloys at Elevated Temperatures. Part I—Deep Drawing Cylindrical Cups,** by D. M. Finch, S. P. Wilson and J. E. Dorn, University of California.
8. **Deep Drawing Aluminum Alloys at Elevated Temperatures. Part II—Deep Drawing Boxes,** by D. M. Finch, S. P. Wilson and J. E. Dorn, University of California.
9. **Soft Soldering,** by M. E. Fine and R. L. Dowdell, University of Minnesota.
10. **Factors Affecting the Hardenability of Boron-Treated Steels,** by R. A. Grange and T. M. Garvey, U. S. Steel Corp.
11. **Temper Brittleness,** by John H. Hollomon, Watertown Arsenal.
12. **New Aluminum Alloys Containing Small Amounts of Beryllium,** by R. H. Harrington, General Electric Co.
13. **Graphite in Cold Rolled Sub-Critically Annealed Hypo-Eutectoid Steels,** by M. A. Hughes and J. G. Cutton, Carnegie-Illinois Steel.
14. **Gas Evolution From Cast Steel at Room Temperature,** by H. H. Johnson, L. H. Arner and H. A. Schwartz, National Malleable & Steel Castings Co.
15. **Investigation of a Type of Failure of 18-8 Stabilized Stainless Steel,** by W. C. Kahn, H. Oster and R. Wachtell, Republic Aviation Corp.
16. **The Influence of Carbon Content Upon the Transformations in 3% Chromium Steel,** by Taylor Lyman, Bendix Aviation Corp., and A. R. Troiano, University of Notre Dame.
17. **Induction Hardening and Austenitizing Characteristics of Several Medium Carbon Steels,** by D. L. Martin, General Electric Co., and W. G. Van Note, North Carolina State College.
18. **The Effects of Combined Stresses and Low Temperatures on the Mechanical Properties of Some Non-Ferrous Metals,** by D. J. McAdam, Jr., G. W. Geil and R. W. Mebs, National Bureau of Standards.
19. **Critical Points of SAE 4340 Steel as Determined by the Dilatometric Method,** by D. Niconoff, Republic Steel Corp.
20. **Quenching of Steel Balls and Rings,** by Victor Paschkis, Columbia University.
21. **The Cold Working and Heat Treatment of a 10-Karat Gold Alloy,** by Vernon H. Patterson and B. N. Iannone, Bausch & Lomb Optical Co.
22. **Metallurgical Characteristics of Induction Hardened Steel,** by James W. Poynter, Army Air Forces, Wright Field.
23. **The Practical Application of Statistical Methods in a Quality Control Program,** by W. T. Rogers, National Tube Co.
24. **The Application of Ms Points to Case Depth Measurement,** by E. S. Rowland and S. R. Lyle, Timken Roller Bearing Co.
25. **High Forging Temperatures Revealed by Facets in Fracture Tests,** by J. Robert Strohm and W. E. Jominy, Chrysler Corp.
26. **Detection, Causes and Prevention of Injury in Ground Surfaces,** by L. P. Tarasov, Norton Co.
27. **The Relationship Between the Deep Drawing Properties of Auto Body Sheet, Its Austenitic Grain Size and McQuaid Carburizing Characteristics,** by K. J. B. Wolfe, David Brown Tractors Ltd., England.
28. **Effect of Nickel on Physical Properties and Thermal Characteristics of Some Cast Chromium-Molybdenum Steels,** by N. A. Ziegler and W. L. Meinhart, Crane Co.
29. **Fracture of Metals Under Combined Stresses,** by D. J. McAdam, Jr., National Bureau of Standards.
30. **A Mechanism of the Surface Decarburization of Steel,** by W. A. Pennington, Carrier Corp.
31. **Some Uses of Tellurium in Gray Iron Metallurgy,** by James O. Vadeboncoeur, General Motors Corp.

American Society for Metals
7301 Euclid Ave., Cleveland 3, Ohio

Please send me the following 1945 ASM preprints.

Nos. .....

.....

.....

Name .....

Address .....

City ..... **State**.....

Metal Literature Review—*Continued*

9. PHYSICAL AND MECHANICAL TESTING

9-82. The Yielding Phenomenon of Metals, V. George Welter. *Metallurgia*, v. 32, May '45, pp. 31-36.
Influence of speed and loading conditions.

9-83. A Convenient Form of Cast-on Indentation Hardness Test-Piece. Thomas B. Crow. *Foundry Trade Journal*, v. 76, May 31, '45, pp. 96-97.
Sufficiently reliable data, as from cast to cast, will be obtained from a cast-on test-piece, particularly if it is run at the same place every time and other factors are kept as constant as possible.

9-84. Fracture Characteristics of Magnesium Castings. P. F. George. *Aluminum and Magnesium*, v. 1, June '45, pp. 14-17.
In detecting the type of fracture resulting from poor design or improper use it is important to determine whether the metal failed by tension, impact, torsion, shear, compression or fatigue. By the examination of the path of the fracture through the structure of the metal the type of stress can often be determined. 4 ref.

9-85. The Effect of Overstress in Fatigue on the Endurance Life of Steel. J. B. Kommers. American Society for Testing Materials, Preprint no. 23, 1945, 11 pp.
If the endurance life at one overstress is reduced by 50%, does that mean that the endurance life at a subsequent higher or lower overstress has also been reduced by 50%? In general, when a high overstress has produced a percentage of damage to endurance life, a subsequent lower overstress will show a greater percentage of damage. This damage to endurance life may be four times greater at the final stress than at the initial stress. When a low overstress is followed by a higher overstress, the damage to endurance life is less at the final stress than at the initial. Harder, stronger steels are more sensitive to damage of endurance life than the softer, weaker steels.

9-86. Single-Strip Compression Test for Sheet Materials. Harry LaTour and Don S. Wolford. American Society for Testing Materials, Preprint no. 30, 1945, 18 pp.
New jig for testing sheet materials in compression using a flat single-strip specimen. The jig prevents lateral buckling of the specimen by providing continuous support in the form of flat guides. Both ends of the specimen extend beyond the jig body an amount exceeding the total deformation during the test. Compression stress-strain data can be obtained on sheet materials using a routine procedure requiring about the same time and care as a comparable tension test. 12 ref.

9-87. Non-Axial Loading of Gray Iron Tensile Specimens. Jasper O. Draffin and W. Leighton Collins. *Foundry*, v. 73, July '45, pp. 94-95, 180, 182.
Results obtained with a limited number of tests made at various times with non-axial or eccentric loading.

9-88. Modern Light Metals. *Automobile Engineer*, v. 35, June '45, pp. 223-228.
Methods employed for routine testing are briefly described and reference is made to some of the more complex techniques for determining mechanical properties at elevated temperatures and to the X-ray back reflection method for measuring residual stresses.

9-89. Fatigue Life of Parts às Affected by Grain Direction. D. D. Stone. *Product Engineering*, v. 16, July '45, p. 442.
Improvement of fatigue life, in a sheet metal bracket assembly, was doubled through a change in grain flow direction. Describes the tests that were made which resulted in redesign for increased fatigue life.

9-90. Testing Aircraft Structures. E. H. Schwartz. *Aircraft Production*, v. 7, June '45, pp. 278-283.
Development and application of the adhesive-patch method.

10. ANALYSIS

10-49. A Spot Test for Molybdenum in Steel. W. H. Hammond. *Iron Age*, v. 155, June 28, '45, pp. 75-76, 138-139.
Advantages of spot tests lie in their savings of time, money and material but such tests should be approached as a screening procedure and not as a substitute for quantitative chemical analyses. Simple test for determining the molybdenum content of alloy described herein was first developed in 1940 and has been in continuous use in several government stations since that time. Procedure is simple and requires no elaborate setups in equipment and chemical reagents. 28 ref.

10-50. Copper in Aluminum. *Metal Industry*, v. 66, June 8, '45, p. 359.
Method employs a mixture of perchloric acid and nitric acid to effect solution of the alloy.

10-51. Analytical Survey of a Rimming-Steel Ingot. J. S. Vatchagandhy and G. P. Contractor. Iron & Steel Institute, Advance copy, May '45, 8 pp.
A 5½-ton ingot of rimming steel containing 0.11% of carbon and 0.45% of manganese was sectioned along the vertical axis for analytical survey and sulphur-printing. The results of chemical analysis made with reference to the distribution of carbon, manganese, sulphur and phosphorus do not appear to indicate any significant departure from the known trend of variations of the segregating elements from the outside to the center of the ingot and from the bottom to the top. 15 ref.

10-52. The Determination of Nitrogen in Ferro-Alloys and Other Materials by Direct Nesslerisation Without Distillation. W. C. Newell. Iron & Steel Institute, Advance copy, May '45, 5 pp.
Direct method, without distillation, for the colorimetric determination of nitrogen applied to the analysis of ferro-alloys by the addition of stabilizing colloids to the Nessler-ammonia coloration. Its application to metallurgical analysis is shown to be extensive, resulting in a far simpler and speedier method for the determination of nitrogen in steel and other alloys. 9 ref.

10-53. A Micro-Spectrographic Method for the Quantitative Analysis of Steel Segregates. J. Convey and J. H. Oldfield. Iron & Steel Institute, Advance copy, May '45, 26 pp.
To obtain a quantitative analysis of the steels for carbon a higher steady-state potential of the spark gap was required. This was produced by blowing a small blast of dried air across the spark gap (pressure, ½ in. of water). The method was standardized and tested. Analyses of segregates were identical with those obtained with the spot-spark and traverse-spark techniques without air blast. Variations in the macrostructures of segregates were found to agree with the content curves obtained via a traverse on the sample.

10-54. Colorimetric Determination of Tungsten. G. Stanley Smith. *Industrial Chemist*, v. 21, May '45, pp. 250-254.
Determining tungsten colorimetrically based upon the reaction of a tungstate solution, containing thiocyanate, with stannous chloride whereby a yellowish coloration is produced. 5 ref.

10-55. "Lead Printing" Ferrous and Non-Ferrous Metals. W. B. Wragge. *Metallurgia*, v. 32, May '45, pp. 3-6.
Introduction of small percentages of lead in steels to improve their machining properties has increased the need for developing a method of lead printing in order that the distribution of the lead can be examined. Technique described in this communication employs a dilute caustic soda solution which not only gives satisfactory prints of lead in lead bearing steels but is also applicable to non-ferrous metals.

10-56. Qualitative Inorganic Microanalysis Without Hydrogen Sulphide, II. R. Belcher and F. Burton. *Metallurgia*, v. 32, May '45, pp. 37-39.
Gives, in schematic form, details of the methods which were outlined in Part I.

10-57. The Cobalticyanide Ion as a Precipitant for Metal Ions. B. S. Evans and D. G. Higgs. *Analyst*, v. 70, May '45, pp. 158-165.
Determination of: (a) Cadmium in Pb-Sb-Cd and Pb-Sn-Cd alloys; (b) silver in lead; manganese in citrate solutions.

10-58. Some Examples of the Use of the X-ray Powder Diffraction Method in Quantitative Analysis; the Determination of Small Amounts of (a) Calcium Oxide in Magnesium Oxide; (b) Zinc Oxide in Zinc Sulphide. H. P. Rooksby. *Analyst*, v. 70, May '45, pp. 166-168.
Two examples of the use of X-ray powder diffraction methods in quantitative analysis are described. It is shown that calcium oxide can be detected in magnesia in as low a concentration as 0.1%. With zinc oxide in zinc sulphide the lower limit is approximately 0.2%.

10-59. Spectrographic Analysis of Magnesium Alloys. B. L. Averbach. *Industrial & Engineering Chemistry* (Analytical Edition), v. 17, June '45, pp. 341-348.
Describes the spectography of a magnesium-base alloy containing 6% aluminum, 3% zinc, and 0.20% manganese. A statistical analysis of the procedure indicated that an accuracy of at least ±5% of the contained element was reasonable for this material. In addition, methods of casting a representative sample free from microshrinkage were investigated. 4 ref.

10-60. Electrolytic Determination of Copper and Zinc in Brass Plating Baths and in Brass Electrodeposits. A. S. Miceli and R. E. Mosher. *Industrial & Engineering Chemistry* (Analytical Edition), v. 17, June '45, pp. 377-378.
Electrolytic method for zinc and copper, in which the copper and zinc are codeposited from a cyanide solution containing ammonium sulphate and ethanolamine; the deposit is dissolved in sulphuric and nitric acids, and the copper is deposited; has been successfully used for the determination of copper and zinc in brass plating baths and in electrodeposited brass, and has also been adapted to the determination of cadmium, zinc, or copper in plating baths. 2 ref.

10-61. Colorimetric Determination of Nickel with Dimethylglyoxime. A. M. Mitchell and M. G. Mellon. *Industrial & Engineering Chemistry* (Analytical Edition), v. 17, June '45, pp. 380-382.
Spectrophotometric study was made of the colorimetric method involving formation of a soluble red complex by treating nickelic ion in ammoniacal solution with dimethylglyoxime. Metals which precipitate in ammoniacal solution are removed in the procedure, unless it is possible to prevent precipitation through some suitable reaction.

10-62. Microdetermination of Copper with the Polarograph. Christopher Carruthers. *Industrial & Engineering Chemistry* (Analytical Edition), v. 17, June '45, pp. 398-399.
Salicylaldoxime investigated as a reagent for the polarographic determination of small amounts of copper. 5 ref.

11. LABORATORY APPARATUS, INSTRUMENTS

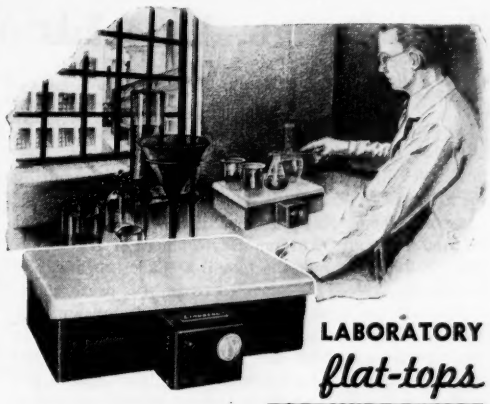
11-43. Electronic Control. *Automobile Engineer*, v. 35, May '45, pp. 190-192.
Applications of B.T.H. equipment to resistance welding machines.

11-44. Measurement of Stresses in Rotating Shafts. W. F. Curtis. *Electronics*, v. 18, July '45, pp. 114-122.
Resistance-wire strain gages mounted on the shaft facilitate vibration analysis and fatigue-strength calculations. Methods of measuring both steady and alternating stresses caused by thrust, bending and torque are discussed. Tests on the propeller shafts of naval vessels are used as examples.

11-45. The Electric Strain Gage. Given Brewer. *Metal Progress*, v. 48, July '45, pp. 91-96.
Elementary considerations of mechanics and the relationships between stresses, strains and directions will introduce a description of modern strain gages and their use. Their use is being extended by engineers of all sorts in a study of new designs, the determination of safe loads on existing equipment, or the investigation of obscure failures.

11-46. Preparation of Specimens for Microscopic Examination. Frank J. Cerman. *Better Enameling*, v. 16, June '45, pp. 6-10.
Basic methods for the preparation and subsequent examination of specimens.

(Continued on page 9)



LABORATORY
flat-tops
FOR WIDE-RANGE
CONTROLLED HEATING

Improved to give even better performance, with input control mounted directly to the hot plate and completely wired, the new Lindberg Hot Plates are the last word in convenience, appearance, efficiency.

For laboratory jobs such as boiling, evaporations, general heating, etc., they allow raising or lowering plate temperatures to any degree from 110° F. up to the maximum of 950° F.

In three practical sizes, at your laboratory equipment dealer's. See him for full particulars.

LINDBERG ENGINEERING COMPANY
2450 W. Hubbard Street Chicago 12, Illinois

Mention R-153 When Writing or Using Reader Service.

Buehler

Splash guard opened showing jet pipe for coolant; a companion jet is on the opposite side of the wheel.

Complete view of cabinet showing storage bin for extra wheels and tools.

New 1 H.P.
CUT-OFF
MACHINE

A laboratory size cutter with ample power for fast cutting of samples up to 1" in diameter.

This cut-off machine is built with the usual Buehler emphasis on precision in both the construction of the machine itself and the work it performs. The controls are arranged for the utmost convenience of the operator — a feature that contributes to speed and accuracy in cutting samples.

The cutting wheel mounted directly on the ball bearing motor shaft is free from side play or vibration and is cooled by a stream of coolant directed on both sides of the wheel under the guard.

The cutting is done on the front of the wheel by using the long lever handle to raise the clamp base holding the sample to contact the wheel. This mechanism is balanced so that pressure against the cutting wheel is under perfect control at all times by the operator. A metal splash guard, removed in the illustration, furnishes protection from spray.

Overall dimensions are 24" x 28" x 50". Shipping weight, 575 lbs.

THE BUEHLER LINE OF SPECIMEN PREPARATION EQUIPMENT INCLUDES . . . CUT-OFF MACHINES • SPECIMEN MOUNT PRESSES • POWER GRINDERS • EMERY PAPER GRINDERS • HAND GRINDERS • BELT SURFACERS • POLISHERS • POLISHING CLOTHS • POLISHING ABRASIVES

Buehler Ltd.
A PARTNERSHIP
METALLURGICAL APPARATUS
165 WEST WACKER DRIVE, CHICAGO 1, ILL.

Mention R-154 When Writing or Using Reader Service.

Tool Design, Materials Changed by War

Reported by Eugene V. Ivanso
Metallurgical Engineer, Steel Sales Corporation

A. H. d'Arcambal, vice-president and consulting metallurgist of Pratt and Whitney, a native Detroiter, came back home May 14 to tell the local chapter what he thought about "Wartime Development of Tool Steels and Tools." Never loathe to call a spade a spade, Mr. d'Arcambal voiced his experiences and his preferences.

The war has brought about various design and materials changes in the cutting tool industry which in 1943 produced about 45 million dollars worth per month as compared with about 6 million dollars per month in 1940. To accommodate harder materials, taps are now largely made of high speed steels; the use of spiral pointed taps is on the increase. In reamers, increased prominence is noted for the right-hand spiral fluted chucking type, the stub type for screw machine work and the duplex spiral fluted type for breaking up chips. The better the surface finish on reamers, the better the life. Cutters with inserted carbide blades brazed to the body have given exceptional service—up to 640 cu. in. per min. on aluminum. Wide favor is accorded the negative rake milling cutter.

The speaker's yen is pretty much for the 18-4-1 or 18-4-2 types of high speed steel. "Moly" types do a fine job if properly hardened, and the best way to harden the "molys" properly is in molten salt bath furnaces. For roll thread dies, rotary shears, slitters etc., air hardening steels of the 1% C, 5% Cr, plus Mo and V type have become very popular. As to cast alloys, the speaker prefers either high speed steel or the carbide tools, although this intermediate material does excellently on certain jobs.

For hardening all high speed steel (unless the tool is too large) Mr. d'Arcambal goes all out for molten salt baths—and at least a double draw, preferably triple. Nitrided high speed steel reamers outlast untreated ones two or three to one; otherwise nitriding has indefinite virtues. It shows promise for certain types of taps, cut-off tools, and multiple thread milling.

Steam oxidizing of tools is a new process which has interesting possibilities. Flash chromium plating occasionally appears to be beneficial on taps, used on non-ferrous metals, but generally its advantage over other surface treatments is still controversial.

The speaker has conducted many field tests of sub-zero treated high speed steel tools all of which have produced negative results, whether the tool was initially correctly heat treated or not. The process has great virtues, however, for making shrink fits, and for treatment of straight carbon and the 1% C, 5% Cr steels—but it just doesn't do anything for high speed steel.

Great promise is held out for induction hardening of tools, but several practical problems must first be licked. Thread rolling has overshadowed thread milling in the matter of smoother surfaces and better fatigue resistance.

National Tube Names John L. Young Vice-President of Engineering

Election of John L. Young to the newly created post of vice-president in charge of engineering has been announced by National Tube Co., subsidiary of U. S. Steel Corp. Mr. Young has been vice-president in charge of industrial research and development of the United Engineering and Foundry Co., of Pittsburgh.

Mr. Young began his career with the Timken Roller Bearing Co., in Canton, Ohio, holding various positions in the alloy tube and steel departments, and the metallurgical department, eventually becoming assistant general manager of Timken's industrial division.

Mr. Young joined the United Engineering and Foundry Co. in 1936, and in 1941 was loaned as project manager to design and construct the Defense Plant Corp. aluminum rolling mills at Trentwood, Wash.

DO YOU HAVE

Equipment for sale, or do you need some special type of machine that can't be had readily? Why not try the classified ads in THE METALS REVIEW? These classified ads are only $20.50 per column-inch. Minimum space requirements ½ inch. Send your copy to:

THE METALS REVIEW
7301 Euclid Avenue Cleveland 3, Ohio

Penn State Honors McFarland

Part of the group that gathered to honor Professor McFarland on his retirement after 25 years at Pennsylvania State College.

More than 120 alumni, students, faculty, and friends of Pennsylvania State College attended a dinner at the State College Hotel on May 19 in honor of David F. McFarland, who is retiring after 25 years as professor and head of the department of metallurgy. The affair was sponsored jointly by the Penn State Chapters of the ASM and the Mineral Industries Society, with Frank Marold as chairman of the arrangements committee.

Prof. H. B. Northrup served as toastmaster. The guest speaker, George S. Rose, secretary of the American Iron and Steel Institute, spoke on the subject, "Metallurgy Looks Forward."

Dean Edward Steidle emphasized Dr. McFarland's contribution to the Nation's accomplishment in World War II by listing a large number of outstanding metallurgists whose training had been received under his direction. Dr. McFarland's scientific career in chemistry and metallurgy was reviewed by Prof. H. M. Davis. A leather-bound set of Dickens' works was presented to Prof. McFarland, with the best wishes of all those present and with written greetings from many who were unable to attend.

Low Temperature Welding Advantages Pointed Out

Reported by Samuel N. Hunter
Consulting Engineer

"Low temperature welding is helping industry accomplish modern miracles in the three major fields of fabrication, reclamation, and maintenance," Albert E. Zeisel, midwestern regional sales manager for the Eutectic Welding Alloys Co., claimed in an address before the St. Louis Chapter ASM on May 18. Substituting for Dr. Gregory J. Comstock, the scheduled speaker who was unable to be present, Mr. Zeisel quickly dispelled any disappointment the audience may have expected to feel.

A. E. Zeisel

Generalizing on the metallurgy of welding, Mr. Zeisel continued: "Metallurgists have always been aware of the tremendous advantages welding at lower temperatures would mean to metal joining. The high temperatures of arc and acetylene fusion welding are apt to deform and weaken the parent metal at the work spot. When utectic low temperature welding rods are used," said Mr. Zeisel, "this disadvantage is eliminated, since at no time is the parent metal heated to the fusion point."

At the conclusion of the meeting, Mr. Zeisel was invited to execute an application for ASM membership.

Lt. Newton L. Margulies, of the Judge Advocate General's Department, United States Army, was the other speaker of the evening and discussed the problem confronting the army in the care, discipline and re-education of prisoners of war.

Faust and Hohe Organize Paragon Spring Co. in Chicago

Paragon Spring Co. has been organized in Chicago by Harry C. Faust and Christie W. Hohe, both identified with the spring industry for many years, to manufacture coil springs for all mechanical purposes, small flat springs, and wire forms.

The company offers a complete service not only in the manufacture of springs up to 2½ in. diameter bar, but in engineering and consultation on spring design. Latest type of automatic equipment has been installed and sales offices have already been set up in Detroit, Minneapolis and Seattle.

Previous to the organization of Paragon, both Mr. Faust and Mr. Hohe had been associated with the Chicago Coil Spring Co., Mr. Faust as chief engineer and metallurgist, and Mr. Hohe as general factory superintendent.

Carnegie-Illinois Promotes Mitchell, Two Others

Carnegie-Illinois Steel Corp. has announced the appointment of John Mitchell as manager of the products section of the alloy sales division. Mr. Mitchell, who has been alloy metallurgical engineer for Carnegie-Illinois in Pittsburgh, is widely known for his work in furthering the development of the National Emergency steels.

During World War II he has been chairman of the Technical Advisory Committee, Alloys and Carbon Steels, War Production Board; leader of the construction and alloy steels of the Metallurgical and Operations Committee, War Production Board; chairman of the Alloy Technical Committee of the American Iron & Steel Institute; and a member of the Joint British - Canadian - American Metallurgical Committee. In 1943 he won the medal award of the American Iron & Steel Institute for the best paper entitled "Trends in Alloy Steels," and is an active member of the American Society for Metals.

John Mitchell

Albert L. Kaye has been appointed to succeed Mr. Mitchell as metallurgical engineer, alloy steel products, in Pittsburgh, and his former position as manager of the alloy bureau, Chicago metallurgical division, is being taken by Maurice J. Day.

Mr. Day, formerly alloy contact representative servicing automotive manufacturers, is a graduate of Michigan State College in 1937 with a B.S. degree in chemical engineering, a master's degree in science, and a doctor's degree in physical chemistry. He has been associated with Carnegie-Illinois Steel Corp. since 1937.

Mr. Kaye was graduated from Massachusetts Institute of Technology in 1934 where he received his bachelor's, master's, and doctor's degrees in science (electrochemical engineering). He held the Gerard Swope Fellowship in physics at MIT and also held a teaching fellowship in chemistry at California Institute of Technology. He first became associated with Carnegie-Illinois in 1936.

Maguire Industries, Inc. Forms Powder Metallurgy Division

Two powder metallurgy companies have been merged into a new division of Maguire Industries, Inc. The companies are the Ferrocart Corp. of America and the Micro Products Corp. and the new division will be known as the Micro-Ferrocart Products Division of Maguire Industries.

Election of Harry A. Ford, founder and president of the two firms, as a vice-president of the Maguire organization and general manager of the new division also was announced.

Operations have been moved from Hastings-on-Hudson to one of the Maguire plants in Stamford, Conn., where an expansion program of more than $200,000 is under way.

Ziv Appoints Schmitt Sales Promotion Manager

Charles G. Schmitt is now sales promotion manager in the eastern territory for the Ziv Steel & Wire Co. New York offices are located at 1437 Doris St., New York 61, N. Y.

A.S.M. Review of Current Metal Literature — *Continued*

11. LABORATORY APPARATUS, INSTRUMENTS (*cont.*)

11-47. Instrument for Measuring Thickness of Non-Conducting Films Applied Over Non-Magnetic Metals. Allen L. Alexander, Peter King, and J. E. Dinger. *Industrial & Engineering Chemistry* (Analytical Edition), v. 17, June '45, pp. 389-393.

Extensive application of camouflage paint to military aircraft, whose paint surfaces are constructed largely from the light metals and their alloys, emphasized the need for a non-destructive method for measuring thickness of paint films applied to non-magnetic metals; instrument described for making such measurements and data presented illustrating its use. The gage satisfactorily measures coatings containing metallic as well as non-metallic pigments. 3 ref.

11-48. Survey Uncovers Potential Uses for Electronic Devices. *Chemical & Metallurgical Engineering*, v. 52, June '45, pp. 110-111.

Survey defines the field of industrial electronics both in terms of actual devices in use and the problems of industry that electronic devices might help solve. Calls attention to some of these suggested applications.

11-49. Metallographic Technique, I. *Metal Industry*, v. 66, June 29, '45, pp. 411-412.

Polishing; mounting of wire and sheet; identification of specimens. 4 ref.

11-50. New Developments in Electron Microscopy. Robert G. Picard. Franklin Institute *Journal*, v. 239, June '45, pp. 421-436.

Developments which have importance in medicine, bacteriology, chemistry, physics and metallurgy.

11-51. A Transfer Strain Gage for Large Strains. Martin Greenspan and Leroy R. Sweetman. National Bureau of Standards *Journal of Research*, v. 34, June '45, pp. 595-597.

Simple strain gage, suitable for measurement of strains of from 16 to 32% on a 1.5-in. gage length, is described.

11-52. Resistance Wire Strain Gage Applications and Circuits. E. G. Van Leeuwen and W. F. Gunning. *Product Engineering*, v. 16, July '45, pp. 443-449.

Application techniques and problems of making and mounting resistance wire strain gages for stress-strain analysis discussed in detail. Describes strain gage circuits sensitive to stretch, bending, shear, torque, pressure and displacement.

11-53. Electric Gaging Methods. Howard C. Roberts. *Instruments*, v. 18, June '45, pp. 389-393, 410, 412, 414.

For strain, movement, pressure and vibration.

12. INSPECTION AND STANDARDIZATION

12-132. Lens Inspection Stepped Up With a Compact Instrument. William S. Mazar and Walter Wallin. *American Machinist*, v. 89, June 21, '45, pp. 96-97.

Inspector lays the test piece on a guide and turns an eyepiece located at a convenient height.

12-133. Air Gages Speed Inspection. W. J. Hargest. *American Machinist*, v. 89, June 21, '45, pp. 114-118.

Demands in Britain for greater economy of labor and faster inspection of precision machined parts gave impetus to improvement and extended use of pneumatic gages, originally developed in Australia to operate at 1 psi. pressure. British gages use 30 psi. air pressure. The principles involved in their operation, and the application of these principles to gages for checking 20-mm. shell, cartridge case caps, and mica film thickness are described.

12-134. Statistical Control of the Manufacture of Steel Tank Shoes. A. E. R. Westman and R. W. S. Freeman. *Canadian Metals and Metallurgical Industries*, v. 8, June '45, pp. 38-43.

Account of the methods applied and the control achieved during the past ten months.

12-135. American - British-Canadian Screw Thread Standards Being Coordinated. *Screw Machine Engineering*, v. 6, June '45, pp. 50-51.

Second progress report.

12-136. How the Hercules Powder Company Purchases Stainless Steels. W. L. Hewes. *Steel*, v. 117, July 9, '45, pp. 100-101, 134, 136, 138, 140, 142, 148, 150, 152, 154.

Development of satisfactory working specifications and tests for steels for use in chemical processing are described.

12-137. X-Ray in Postwar Era. *Steel*, v. 117, July 9, '45, pp. 102-103, 156, 158, 160.

Inspection medium's relatively brief history replete with achievements. More efficient use of metals, fewer rejections, and lower costs through proper design make strong argument for X-ray expansion in next few years.

12-138. Standardization of Shackles. *Iron Age*, v. 156, July 12, '45, pp. 50-54.

A fatal accident resulting from the failure of a wire rope sling shackle, led to an extensive investigation of drop forged shackle quality and the drawing up of rigid specifications for inspection and test, out of which it is hoped a national standard will eventually be developed.

12-139. Radiography as a Control of Quality in Die Castings, I. E. T. Kilbride. *Die Casting*, v. 3, July '45, pp. 68-70, 72.

How a producer of die castings uses X-ray in the development of a proper die design and casting technique.

12-140. Development of Stereoscopic Photography and Radiography. Leslie P. Dudley. *Light Metals*, v. 8, June '45, pp. 259-269.

Important phases in the history and development of stereoscopic photography and radiography. Certain processes for the production of stereoscopic pictures which do not entail the use of individual viewing devices are discussed in greater detail. Some new processes, whereby stereoscopic radiographs of the parallax panoramagram type are produced, are described for the first time.

12-141. Hardenability Band Data Set Up for 35 More Steels. *Steel*, v. 117, July 16, '45, pp. 116-121.

Joint committee of Society of Automotive Engineers and American Iron and Steel Institute add three nickel, two chromium-nickel, five nickel-molybdenum and 25 NE steels to the "H" group. Data for complete standard steel list now being prepared. Bands based upon present chemistry will be set up later.

12-142. Casting Inspection. E. J. C. *Machinery* (London), v. 66, June 14, '45, pp. 649-651.

Foundries dealing with large castings definitely cannot afford to have rejected work and have developed design, molding and casting technique and methods of supervision to such a degree that rejects are exceptional. Careful visual inspection is made and soundings are taken after cleaning or sandblasting. Application of certain modern developments described; assists examination of large castings to a far greater degree.

12-143. Infra-Red in Industry. D. H. Killeffer. *Scientific American*, v. 173, July '45, pp. 40-43.

By harnessing forces that act outside the bounds of human senses, and applying electronic amplification, chemical control methods have been highly refined. The infra-red technique is not yet in wide use, but successful results so far point to broad future fields.

12-144. Inspection Efficiency. J. C. Edwards and W. A. Bennett. Institution of Mechanical Engineers *Journal*, v. 152, June '45, pp. 69-75.

Outlines numerous directions in which improvements can be sought in engineering inspection. Shows how direct improvements in efficiency can be effected by carefully planned methods of recording results, including the use of statistical quality control, by adopting the principles of time and motion study in the planning of flow of work through inspection, and in the design of gaging fixtures and the arrangement of gages.

12-145. The Application of Statistical Methods to the Control of Industrial Costs. Norman R. Neal. Institution of Mechanical Engineers *Journal*, v. 152, June '45, pp. 76-81.

Quality control studies the variation from standard of tangible articles, whereas "cost control" studies the variation from standard of the workers' efficiency, and consequent variation in production cost. In essence, the system consists in setting standard times, and thus standard costs, for all jobs and for the elements making up the complete jobs.

12-146. Sampling Schemes for Qualitative Inspection. A. W. Swan. Institution of Mechanical Engineers *Journal*, v. 152, June '45, pp. 81-92.

Applications of "qualitative" inspection. Industrial and theoretical factors affecting the choice of a sampling scheme for qualitative inspection are discussed, particularly producer's and consumer's risk. Concludes with instructions on when and how to change to more severe sampling conditions, when results from successive samples show a deterioration in quality and the need to keep the new conditions in force until there is satisfactory evidence that the quality has improved again to the process average.

12-147. Controlling Quality of Steel Castings. John W. Juppenlatz. *Iron Age*, v. 156, July 19, '45, pp. 50-54.

Although many non-destructive tests are now in commercial use for checking the soundness of steel castings, high quality is something that must be built into the product rather than inspected into it. Many inspection checks, while too costly except for the most critical castings, do serve to prove pilot methods which can be maintained in production under proper controls. Radiographic tests; fluorescent method; design precautions; heat treating factors.

13. TEMPERATURE MEASUREMENT AND CONTROL (PYROMETRY)

13-23. Temperature Control. *Automobile Engineer*, v. 35, May '45, pp. 183-189.

Color registering mixtures for desired application to heated surfaces.

13-24. 168° Below Zero. G. W. Birdsall. *Steel*, v. 116, June 25, '45, pp. 126, 128, 130, 132.

Great expansion in application of "cold" involves much special equipment to meet the many different service requirements. Lansing plant features a variety of machines to handle metal-working in production of "cold" units.

14. FOUNDRY PRACTICE AND APPLIANCES

14-194. Quality Control in Die Casting. *Machinery* (London), v. 66, May 31, '45, pp. 606-607.

Simple system of control which has provided a useful check on the soundness of the castings and assisted in maintaining their quality at a high level.

14-195. The Development and Application of Pattern Equipment for the Production of a Light Alloy Casting. F. H. Hoult. *Foundry Trade Journal*, v. 76, May 31, '45, pp. 89-95, 97.

Describes the different methods used and equipment necessary to produce varying quantities of a certain casting.

14-196. Mold Design for Aluminum Bronze Die Castings. R. F. Lockyer. *Foundry Trade Journal*, v. 76, May 31, '45, pp. 98-100.

Need for cooperation between the designer and the foundry. Die design; knowledge of foundry procedure; runners and risers; modulus of elasticity.

14-197. A Departure From Standard Practice. W. Wilson. *Foundry Trade Journal*, v. 76, May 31, '45, pp. 101-103.

Economy in ordering and storage of firebricks for small foundry.

14-198. Cast Crankshafts. Joseph Geschelin. *Automotive Industries*, v. 92, June 15, '45, pp. 28-30, 110, 112.

Quantity production through special techniques and rigid control at C-W-C foundry.

14-199. Properties of a General Purpose Aluminum Sand Casting Alloy. R. A. Quadt. *Aluminum and Magnesium*, v. 1, June '45, pp. 18-19, 22-23.

Discusses an aluminum sand casting alloy which has proven itself in commercial practice. F-430 belongs to the aluminum-copper-silicon group.

14-200. Consistency and the Cupola. C. A. Payne. *Foundry Trade Journal*, v. 76, June 7, '45, pp. 111-117.

An outline of factors affecting the control of cupola melting.

14-201. Plaster, Plastics and Low Melting Point Metals in Patternmaking. H. Plucknett. *Foundry Trade Journal*, v. 76, June 7, '45, pp. 119-123.

Decorative work and the use of plaster in the foundry.

14-202. Magnesium Die Castings. *Metal Industry*, v. 66, June 8, '45, p. 364.

Generous fillets, which instead of being rounded should be elliptical, help considerably in eliminating rejects due to cracking of the casting while it is being ejected from the die.

14-203. The Reclamation of Foundry Sands. II. F. E. Fisher and A. C. Denbreejen. *Pig Iron Rough Notes*, no. 99, Spring-Summer, '45, pp. 27-35.

Reclamation of foundry sands with particular emphasis on the hydraulic or wet system of sand reclamation.

14-204. Plaster Mold Casting. W. P. Brown. *Steel*, v. 117, July 2, '45, pp. 96-98, 140, 142, 145.

Affords unusual dimensional accuracy, faithful reproduction of fine details, attractive as-cast surface. Two standard bronzes, one brass and one aluminum alloy now in regular prodution.

(Continued on page 10)

Neither planes, tanks, ships nor guns could operate efficiently without scores of precision built, automatic controls. And wherever temperature is a factor, Chace Thermostatic Bimetal is constantly being called upon by the control builder to serve as the actuating element for his device, for indication, control, or both.

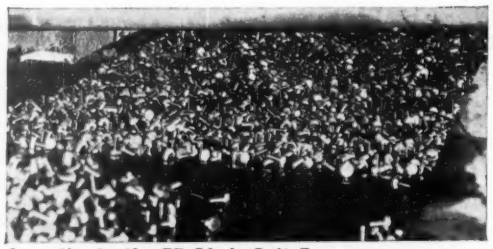
These war-time applications cover a temperature range from −100 to +1000° F. And at any pre-determined point within that range, Chace bimetal may be called upon to give the impetus to start, or to stop, some vital function. That is, it must convert temperature into action; automatically, instantly, and without fail.

Similarly, in the home, appliance manufacturers utilize the known properties of specific types of Chace bimetal to convert temperature into action in devices ranging from toasters to furnace controls, or to refrigerator motor protection.

There are thirty-five types of Chace Thermostatic Bimetal, each of which offers specific advantages to control builders. Sold in sheets, strips, and finished forms.

W.M. CHACE CO.
Manufacturers of
Thermostatic Bimetals and Special Alloys
1612 BEARD AVE • DETROIT 9, MICH.

Mention R-155 When Writing or Using Reader Service.



Investigate the EF Chain Belt Furnace

For Hardening Small Parts

Uniformly—Scale-free—Continuously 175 to 2000 lbs. per Hour.

Products being treated in EF Chain Belt Furnaces, include:

Sprockets
Cap screws
Bolts and nuts
Gears and pinions
Flat springs
Coil springs
Small forgings
Valve springs
Spring plates
Tractor links
Rivets and washers
Wrench & tool parts
Bearing parts, cups and cones
Machine gun cartridge clips
Aircraft engine parts
Automotive parts
Rock bits, etc.

EF chain belt furnaces handle products ranging in size from small bolts and springs up to large crawler links for tractors. Hundreds are in operation handling such products as listed at left.

The chain belt conveyor type furnace is one of the most satisfactory and dependable general purpose heat treating machines built for the continuous, uniform, economical, production heat treatment of miscellaneous small and medium sized parts and products.

They may be oil fired, gas fired or electrically heated.

Telephone 4661 Salem, Ohio, or write us regarding your furnace problems. We specialize on building production furnaces—

Send for circulars showing the chain belt and other types of EF production furnaces

The Electric Furnace Co., Salem, Ohio

Gas Fired, Oil Fired and Electric Furnaces—For Any Process, Product or Production

Mention R-156 When Writing or Using Reader Service.

Cross section of Kemp Immersion Heating element showing tubular construction and method of flue gas travel.

Specify

KEMP IMMERSION MELTING

for

Lead melting	**Compound heating**
Tin coating	**Stereotyping**
Tin melting	**Electrotyping**
Pewter melting	**Solder melting**

Battery grid casting
Salt baths for annealing
Lead baths for tempering
Lead baths for annealing

The Kemp IMMERSION MELTER is the standard of industry because of the following features:

1. Heating units are placed **inside** the metal to be melted—not outside the pot.
2. 40% savings in fuel.
3. Close temperature control increases efficiency, reduces waste.
4. The metal melts faster—cools slower.
5. The pot is insulated, serves only as a container, and does not crack.
6. Reduction in dross formation.
7. Improved working conditions.

For complete information . . . .

ASK FOR BULLETIN J-200.1

Address
The C. M. Kemp Mfg. Company, 405 E. Oliver St., Baltimore 2, Md.

KEMP PRODUCTS

Dynamic Dryers (Adsorptive Dehydrators)
Nitrogen Generators • Inert Gas Producers
Atmos-Gas Producers • Immersion Heaters
Flame Arrestors for vapor lines, flares, etc.
The Industrial Carburetor for premixing gases
Submerged Combustion Burners
A complete line of Industrial Burners, and Fire Checks.

KEMP OF BALTIMORE

Mention R-157 When Writing or Using Reader Service.

14. FOUNDRY PRACTICE (*cont.*)

14-205. **Development and Properties of Sandcast Aluminum Alloy Having High Strength After Aging Without Previous Heat Treatment.** Hiram Brown. *Western Metals*, v. 3, June '45, pp. 8-12, 15-16.

Development and properties of a sand-cast aluminum-base alloy containing magnesium, zinc, and small amounts of titanium and chromium. This alloy has the ability to develop high strength properties on aging without undergoing heat treatment. 9 ref.

14-206. **Precision-Cast High Speed Steel.** *Machinery* (London), v. 66, June 14, '45, pp. 641-647.

Making of high speed steel cutters by precision casting. An unusual application of an unusual method described.

14-207. **Foundry Research at the Naval Research Laboratory.** William G. Gude. *Foundry*, v. 73, July '45, pp. 84-87, 167, 171-172, 174.

Seeks to emphasize importance of the role which research has played and can continue to play in improving casting quality and foundry practice.

14-208. **Magnesium Castings for Aircraft Engines.** Edwin Bremer and Huey Summers. *Foundry*, v. 73, July '45, pp. 96-99, 224-226.

By resorting to mechanization wherever possible in the Cincinnati magnesium foundry of Wright Aeronautical Corp., employee fatigue is held to a minimum, less dependence is placed on the human element, and better uniformity is maintained in production.

14-209. **Pressure Casting Aluminum Matchplates.** J. P. Callahan. *Foundry*, v. 73, July '45, pp. 100-101, 240.

Metal patterns preferred. Ingredients for the molds consist of fibrous magnesium silicate or talc, a type of plaster of paris known as molding or casting plaster, and water. Other materials, such as silica sand, marble dust and similar products, are considered harmful for best results and should not be used.

14-210. **Pearl Harbor Foundry Keeps Navy Ships Fighting.** E. C. Kreutzberg. *Foundry*, v. 73, July '45, pp. 104-109.

Important role of the foundry at the Pearl Harbor Navy Yard in keeping the U. S. Fleet in fighting trim.

14-211. **Control in the Gray Iron Foundry.** A. J. Edgar. *Foundry*, v. 73, July '45, pp. 88-89, 215-216, 218, 220, 222.

Importance of technical control, and difficulties encountered by the gray iron foundrymen through lack of such control.

14-212. **Symposium on Continuous Casting, Held by the American Institute of Mining and Metallurgical Engineers.** *Sheet Metal Industries*, v. 21, June '45, pp. 995-999, 1000.

Points from some of the papers and discussions; early history of process; summary of processes; Alcoa DC process; E. R. Williams process; alloy steel; requirements of continuous casting; the Goss process; improvements in the direct rolling of strip metal; lack of uniformity; casting steel.

14-213. **Future of the Light Alloy Foundry Industry.** W. C. Devereux. *Metal Industry*, v. 66, June 22, '45, pp. 387-389.

Eighth Edward Williams Memorial Lecture.

14-214. **Semi-Continuous Casting.** W. M. Doule. *Metal Industry*, v. 66, June 22, '45, pp. 390-393.

Production of light alloy ingots by direct chilling. 2 ref.

14-215. **Structure Control of Gray Cast Iron, Part I.** R. G. McElwee and Tom E. Barlow. *Vancoram Review*, v. 4, Spring, '45, pp. 6-8, 21.

Reduces structural variations; effects of inoculation; hardness and strength.

14-216. **Precision Founding.** Francis Dittmar. *Iron Age*, v. 156, July 12, '45, pp. 46-49.

Analysis of the making of a wooden "try pattern," the first step in the process of arriving at accurate master patterns by trial and error.

14-217. **When Should a Part Be Die Cast?** Herbert Chase. *Die Casting*, v. 3, July '45, pp. 21, 46-48, 50, 52.

Analysis of some of the factors which enter into making the proper choice.

14-218. **Magnesium. Part II.** Don Stewart. *Western Machinery & Steel World*, v. 36, June '45, p. 276.

Describes the foundry operation.

14-219. **Superheating in Magnesium-Base Alloys.** F. A. Fox and E. Lardner. *Engineering*, v. 159, June 1, '45, pp. 438-440.

Process of superheating is one in which casting alloy, of the magnesium-aluminum type, is heated to, and held for some appreciable time at, a temperature exceeding 840° C. Metal is then cooled quickly to the casting temperature, which usually lies between 720° and 780° C. Effect of this exposure to a high temperature is to produce a refinement of the grain of the casting. Records and discusses various experimental results concerning phenomena associated with the superheating of magnesium-base alloys.

14-220. **Precision Founding.** Francis Dittmar. *Iron Age*, v. 156, July 19, '45, pp. 62-64, 138.

Procedure for the making of the glue mold given with detailed analysis of all the steps. With the help of the glue mold, a quantity of try patterns can be made which will be utilized to establish the exact dimensions of the master pattern.

15. SALVAGE AND SECONDARY METALS

15-23. **Charge Components for Wrought Aluminum Alloys.** Owen Lee Mitchell. *Light Metal Age*, v. 3, June '45, pp. 16-19, 30.

Various charge components used in the production of wrought aluminum alloys are discussed, so that a clear concise picture of the scrap situation can be obtained. Explains limitations on use of scrap.

15-24. **Selective Salvage.** H. C. Chetwood-Aiken. *Metal Industry*, v. 66, June 8, '45, p. 360.

Applications of rejected materials in other industries.

15-25. **Repair of Steel Castings.** *Foundry*, v. 73, July '45, pp. 92-93, 250-253.

Report covers recommendations for a proposed Engineering Bulletin and Suggested Shop Procedure applying to repair of steel castings.

15-26. **Problems Connected with Reclamation of Worn Parts by the Metal-Spraying Process.** W. E. Ballard. Institution of Mechanical Engineers *Journal*, v. 152, June '45, pp. 4-7.

Describes certain matters of interest to engineers in connection with this form of salvage. Metal spraying is being used commercially to a very large and increasing extent for reclamation work. Answers the following questions: Is metal spraying a suitable method of reclamation? If so, how must the work be prepared for spraying? What method of spraying and which metal should be used? What finish is necessary? 9 ref.

16. FURNACES AND FUELS

16-76. **Determination of Dust in Blast Furnace Gas.** D. G. Hisley. *Iron & Steel Engineer*, v. 22, June '45, pp. 47-49.

Using sugar as a filtration medium, was developed to eliminate difficulties encountered in the standard thimble method.

16-77. **Coke Oven and Blast Furnace Operation.** J. B. Hill. *Iron & Steel Engineer*, v. 22, June '45, pp. 71-75.

No other unit in a steel plant is influenced so much by so many little, yet important, items as is the blast furnace. Uniformly good practice requires careful attention to these details.

16-78. **Aluminum for America.** *Industrial Gas*, v. 23, June '45, pp. 14-15, 27.

There are three distinct steps in the processing of aluminum—mining, refining, and reduction. Refining process requires large amounts of steam which is produced by gigantic gas-fired boilers.

16-79. **Basic Principles of Combustion Engineering of Hot Dip Galvanizing Furnaces, XXXIX.** Wallace G. Imhoff. *Industrial Gas*, v. 23, June '45, pp. 22-23, 31-34.

Galvanizing furnaces; miscellaneous—gas and oil fuels. 12 ref.

16-80. **Coke-Oven Gas.** J. A. Shaw, R. H. Hartigan, and Anna M. Coleman. *Iron & Steel*, v. 18, June '45, pp. 191-192.

Determination of hydrocyanic acid.

16-81. **Electric Steel.** Conrad C. Wissmann. *Iron & Steel*, v. 18, June '45, pp. 197-198, 208.

Notes on the operation of acid lined melting furnaces. (From *Metal Progress.*)

16-82. **Design of Muffles for High Temperature Service.** A. Grodner. *Steel Processing*, v. 31, June '45, pp. 383-384.

Designer and the fabricator of the muffles attempts to solve proper material of construction, ideal shape of the muffle, location and type of the welds to equal the parent metal in strength and ductility over the range of heating and cooling cycle; correct approach to the successful solution of these factors outlined.

16-83. **Pressure Sensitive Control of Furnace Dampers.** *Iron Age*, v. 156, July 12, '45, pp. 61, 130.

Fine adjustment of a furnace damper plays an important part in the maintenance of correct atmospheric conditions within the furnace chamber, and such adjustment should be made not in terms of furnace temperature, but in terms of pressure. Damper adjustment is made on the basis of the behavior of the flame of a lighted match held to the spy hole of the furnace door.

16-84. **Consistency and the Cupola.** C. A. Payne. *Foundry Trade Journal*, v. 76, June 14, '45, pp. 133-137.

Outline of factors affecting the control of cupola melting.

16-85. **Tilting Burners Provide Flexible Furnace Performance.** Elno M. Powell. *Combustion*, v. 16, June '45, pp. 36-39.

Control of exit furnace gas temperatures is most important as a means of preventing excessive slag deposits at the entrance to the convection heating surface and to assist in controlling superheat temperature over a wide range in load. How this is effected by tilting tangential burners upward or downward through a total arc of approximately 60° and typical performance curves derived from tests are included.

16-86. **A Completely Automatic Control of Open-Hearth Reversal.** B. M. Larsen and W. E. Shenk. *Metals Technology*, v. 12, June '45, T. P. 1830, 12 pp. Also *Iron & Steel*, v. 18, June '45, pp. 193-196.

Method of reversal control of the open-hearth furnace that obtains in practice those effects considered as essential to a completely automatic control, without appreciable interference with the natural rise and fall in temperature of the regenerative portions of the furnace system.

16-87. **Fuel-Fired Techniques and Their Possibilities.** Frederic O. Hess. *Mechanical Engineering*, v. 67, July '45, pp. 442-444. Also *Industrial Gas*, v. 23, June '45, pp. 11-13, 30-31.

Fuel-fired techniques for high speed heating. Experience has been with gas firing. High speed heating; heating non-ferrous metals; effect of heating on steel; new developments in combustion.

16-88. **Time-Temperature Relationships in Workpieces.** Victor Paschkis. *Mechanical Engineering*, v. 67, July '45, pp. 445-447, 452.

Temperature uniformity within the workpiece; time of exposure; uniformity of rates. 5 ref.

17. REFRACTORIES AND FURNACE MATERIALS

17-36. **Industrial Electrodes, I.** H. Sanders. *British Steelmaker*, v. 11, June '45, pp. 255-259.

Carbon; genesis of the electrode; carbon and graphite electrodes; form of electrodes; choice of electrodes; iron and steel manufacture; mechanical properties; advantages of graphite; non-ferrous metals; electrolysis.

17-37. **Some Recent Developments in the Manufacture of Refractories.** L. Sanderson. *Refractories Journal*, v. 21, May '45, pp. 186-190.

Ingot heating furnace; electric furnace; blast furnace; insulation; ladles, stoppers and nozzles; bricks for blast furnaces; basic materials; sillimanite products; magnesia clinker; vitrifaction process.

17-38. **Carbon Refractories Meet Severe Temperature Conditions.** *Refractories Journal*, v. 21, May '45, pp. 195-197.

Special shapes; hollow sections; cement and pastes.

Metal Literature Review—*Continued*

18. HEAT TREATMENT

18-150. Thermal Lag in Heat Treatment Operations, With Particular Reference to the Annealing of Malleable Cast Iron. A. E. Peace. *Foundry Trade Journal*, v. 76, May 24, '45, pp. 67-72.

Factors which are not usually given sufficient consideration; heat transfer; convection; radiation; heat capacity; thermal lag; practical examples; shape and size of annealing pots; types of heat treatment furnaces. 9 ref.

18-151. Sub-Zero Treatment. *Automobile Engineer*, v. 35, May '45, pp. 199-202.

Introduction of a sub-zero cooling into the heat treatment cycle has a beneficial effect on many steels. Cycles for various classes of steels are discussed and reference is made to the use of the sub-zero process for expediting stabilization of high precision components such as gage blocks.

18-152. Metallography of Aluminum Alloys as a Shop Control. S. H. Phillips. *Light Metal Age*, v. 3, June '45, pp. 8-11, 28.

Illustrates and discusses manner in which proper metallographic examination reveals different types of faulty heat treatments of commercial aircraft aluminum alloys.

18-153. Improved Quenching. C. G. Purnell and H. M. Pfahl. *Steel*, v. 117, July 2, '45, pp. 88-91, 127.

Produces parts with higher tensile and yield strengths as well as materially increased toughness. Purnell process features strongly agitated quench bath; increased speed of quenching action; precisely timed quench, producing exact end temperature; immediate tempering. Distortion is controlled; machinability increased.

18-154. Annealing Malleable Iron. J. E. Rehder. *Canadian Metals & Metallurgical Industries*, v. 8, June '45, pp. 29-34.

Principles and practice; special processes; annealing cycles.

18-155. Effects of Highspeed Air-Gas Heat on Metals. *Western Metals*, v. 3, June '45, p. 23.

Major advantages listed.

18-156. Heat Treatment of Stainless Steel for Exhaust Manifolds. Wilson G. Hubbell. *Aero Digest*, v. 50, July 1, '45, pp. 98, 100, 103-104, 163.

Effect of stabilizing and stress relief heat treatments upon welded 18-8 stainless steel. Tests were designed to determine the particular benefits, if any, which might be imparted by these processes to types 321 and 347 of the 18-8 stainless steels for use in exhaust manifolds.

18-157. Probable Postwar Trends in Heat Treatment. A. Glynne Lobley. *Metallurgia*, v. 32, May '45, pp. 15-19.

Many types of furnaces are of such a high order that they may be regarded as precision tools and can be operated successfully in the line of production. In dealing with postwar trends, special attention is given to this aspect of heat treatment and a few types of continuous furnaces are cited. Increase in the use of gas carburizing and heat treatment by induction heating comes in for special reference.

18-158. Some Factors Connected with the Heat Treatment of Magnesium Alloys. F. A. Fox. *Metallurgia*, v. 32, May '45, pp. 20-23.

To make the best possible use of the magnesium alloys it is necessary to be familiar with those whose properties can be improved by heat treatment and with the treatment which will give the desired result. A number of these alloys have been used to a great extent during recent years and have become familiar to engineers, but many factors associated with their heat treatment are still imperfectly understood; some of these are briefly discussed.

18-159. Hard Surfaces on Steel by Induction Heating. J. L. Aston. *Metallurgia*, v. 32, May '45, pp. 24-30.

High frequency induction heating has been applied to the heat treatment of parts during recent years. The rapidity of heating and the small floor space necessary make this form of heating especially applicable for use in main production shops. Induction heating is applied for surface hardening or a lower rate of heating is applied so that the part treated may be heated throughout. Progress in this branch of heat treatment in its application to the production of hardened surfaces is reviewed.

18-160. Heat Treating and Refrigerating Aluminum Alloy Rivets for Martin Planes. Harry F. Vollmer. *Machinery*, v. 51, July '45, pp. 154-161.

Rivet handling system that insures efficient use of heat treated rivets and reclamation of all types from floor sweepings.

18-161. Metallurgy of SAE 52100 Ball Bearing Steel. R. J. Hafsten. *Iron Age*, v. 156, July 5, '45, pp. 54-59.

For the purpose of softening SAE 52100 steel for machining and for preparing the carbides for subsequent hardening, the steel is given a spheroidizing anneal. With the aid of numerous photomicrographs, shows the factors influencing carbide spheroid formation, including the ideal austenizing temperature for this purpose and control of spheroid size. Analysis of a properly hardened structure for ball and roller bearing service.

18-162. Jet Quench Minimizes Aluminum Distortion. *Iron Age*, v. 156, July 5, '45, p. 78.

High speed aluminum heat treating equipment consists of a General Electric furnace with throttling reactor controls, loading station and a quench chamber especially designed.

18-163. Mechanical and Metallurgical Advantages of Martempering Steel. B. F. Shepherd. *Product Engineering*, v. 16, July '45, pp. 438-441.

One of the most important recent developments in the field of the heat treating of steels, martempering, is explained in a series of graphs and tables which lead from fundamental considerations to the actual performance and the mechanical and metallurgical advantages of the new process.

18-164. What Heat Treatment Does to Aluminum Alloys. M. E. Tatman. *American Machinist*, v. 89, July 5, '45, pp. 118-121.

Producers of civilian equipment are keenly studying the merits of fabricated aluminum for use in light weight but strong postwar products; in this way they will be aided by the knowledge of aircraft manufacturing plants.

18-165. Isothermal Heat Treatment. *Automobile Engineer*, v. 35, June '45, pp. 249-251.

Use of controlled quenching cycles to give improved properties.

18-166. Progressive Heating Quenching. A. R. Hotchkiss. *Steel*, v. 117, July 9, '45, pp. 104, 162.

Eliminates brittleness and warpage of small parts, increases output greatly. Setup employs induction heating unit.

18-167. Fog Quench Reduces Dural Warping. *Production Engineering and Management*, v. 16, July '45, pp. 93-94.

New method provides uniform quenching temperature, speeds transfer of parts from furnace to quench. Heart of this Bell-developed system is a self-cleaning atomizer nozzle.

18-168. Bearing Races Improved by Isothermal Treatment. J. Paul Deringer. *Metal Progress*, v. 48, July '45, pp. 80-87.

Outstanding results obtained in both quality and quantity of work, associated with generous economic advantages as outlined in an accompanying cost analysis. The performance reflects yet another accomplishment of the isothermal heat treatment.

18-169. Comparative Results Obtained Through the Purnell Method of Heat Treating. Charles G. Purnell and Henry Pfahl. *Steel Processing*, v. 31, June '45, pp. 364-370.

Purnell heat treating system represents a step further toward perfection in which control of the quenching phase of the heat treating operation is exercised to a much higher degree than formerly with an attendant improvement in uniformity of product. Illustrates several parts which have been heat treated according to the Purnell method, obtaining maximum hardness and toughness.

18-170. Scaling Properties of Steels in Furnace Atmospheres, II. A. Preece and R. V. Riley. *Steel Processing*, v. 31, June '45, pp. 379-382.

Results obtained in an examination of the scaling properties of steels at 1150° C. summarized. 3 ref.

18-171. Fundamental Principles and Applications of Induction Heating. Part VII. *Sheet Metal Industries*, v. 21, June '45, pp. 1037-1046, 1052.

Miscellaneous applications. 3 ref.

18-172. Hardening High-Speed Steel. Stewart M. DePoy. *Steel*, v. 117, July 16, '45, pp. 122, 163.

Effect of prior treatment on results of sub-zero process.

18-173. Superheating in Magnesium-Base Alloys. F. A. Fox and E. Lardner. *Engineering*, v. 159, June 15, '45, pp. 478-480.

Grain size of cast metal depends mainly upon the following factors: Mold conditions; casting temperature and speed of pouring; mechanical conditions, turbulence due to pouring or to gas evolution or vibration of mold; surface tension of the solid and liquid phases present during solidification; viscosity of the molten metal; other factors depend upon the nature of the alloys, such as energy of crystallization, latent heat of fusion, and solidification range; the presence of nuclei. (Institute of Metals.)

18-174. Induction Case Hardening. Vernon W. Sherman. *Iron & Steel*, v. 18, June '45, pp. 213-216.

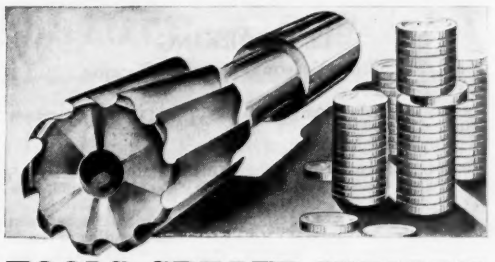
Application of megacycle heating. (Electrochemical Society.) 3 ref.

18-175. Tocco Hardening. H. B. Osborn, Jr. *SAE Journal*, v. 53, July '45, pp. 377-386, 391.

Principles of induction heating with a discussion of the equipment needed, control factors involved, and applications in the automotive industry.

18-176. Influence of Overaging on Aluminum Alloys. *Iron Age*, v. 156, July 19, '45, pp. 66-67, 140, 142.

Effect of aging aluminum alloys for 24 hr. at various temperatures; mechanical properties of high strength aluminum alloy sheet subjected to overaging at 375° F.



TOOLS CREATE WEALTH

Why not decide to get more and better work out of tools, to meet keen competition?
Take advantage of treatments available here which often improve tools 30% to 60% or more. We have specialized in tool treating for a quarter-century. The war has brought new and better methods for original hardening, and also for supplementary treatings of tools purchased in a hardened, finished condition. Now is the time to investigate. Let us show you how other manufacturers have already benefited.
More than half the tools now in common use can be treated so they will run longer between grinds, hold the size better, and produce a smoother finish.
Our "Silver Finish" is bright, clean hardening.
Our "Nusite" means harder, tougher cutting tools.
Our "Ad-Life" improves the tools you buy outside.
Write for booklet, "FIFTY FACTS" . . . It tells what other manufacturers did to improve tool quality and life.

BETTER HARDENING BETTER RESULTS

PERFECTION TOOL & METAL HEAT TREATING CO.
1740-58 WEST HUBBARD STREET CHICAGO 22 ILL

Mention R-159 When Writing or Using Reader Service.

FURNACES FOR RESEARCH!
For over thirty years MULTIPLE UNIT Electric Laboratory Furnaces have played an active part in industrial scientific research. They are standard in most laboratories.
See your laboratory supply dealer or send for descriptive bulletins.
NEVI DUTY ELECTRIC COMPANY

Mention R-160 When Writing or Using Reader Service.

Mention R-158 When Writing or Using Reader Service.

HIGH HEAT FURNACE
12" Wide — 10" High — 18" Long
1400° to 2350°
Full Muffle Protective Atmosphere

RECIRCULATING DRAWING FURNACE
21" Wide — 10" High — 18" Long
250° to 1150°
Floor Space 116" Long and 38" Deep, 65½" High—2 ft. clearance back wall.
Furnace is complete in all details—Merely connect to gas line and power supply.

MANUFACTURED BY
WALTZ FURNACE COMPANY
1549 ELIZABETH PL. CINCINNATI 29, OHIO.

Mention R-161 When Writing or Using Reader Service.

19. WORKING
Rolling, Drawing, Pressing, Forging

19-193. **Quarter-Size Dies.** John A. Cole. *American Machinist*, v. 89, June 21, '45, p. 95.
Simplify press tool development.

19-194. **Intermittent-Acting Mills for Rolling Strip.** J. D. Keller. *Steel*, v. 116, June 25, '45, pp. 135-136, 139, 173-174.
Evans-type mill designed to reduce strip between large roll and migratory rolls. Strip is pulled through Kessler-type mill housing large non-driven roll, stationary platen and small rollers. Proposed intermittent-acting mill employs small planetary rolls which circle about large central roll.

19-195. **The Fundamentals of Tool Engineering. II—The Extrusion of Hard Metals.** *Tool Engineer*, v. 14, May '45, pp. 22-23.
Permits infinite variety of shapes; press forging.

19-196. **Steel for Cold Heading.** J. R. Thompson. *Fasteners*, v. 2, no. 2, '45, pp. 10-13.
Successful production of wire for cold heading requires careful control at all stages in the process of its manufacture, from the charging of the blast furnace down to inspection and testing of the finished material.

19-197. **Trends in Aluminum Fabrication.** J. C. Millson. *Canadian Metals & Metallurgical Industries*, v. 8, June '45, pp. 24-28, 49.
Reduction, remelting, casting, rolling, extrusion, forging, welding, brazing.

19-198. **Studebaker Shot-Peening Technique.** *Automotive Industries*, v. 92, June 15, '45, pp. 19, 96.
Details of the shot-peening technique for improving the fatigue life of highly stressed aircraft engine connecting rods.

19-199. **Production of Dies for Armature Laminations.** *Machinery* (London), v. 66, May 24, '45, pp. 557-562.
Typical set of press tools for armature laminations is shown. Tools are of the follow-on two-station pattern, punch first of all coming into action to cut the necessary slots and the center hole in the strip material.

19-200. **The Krause Mill Reduction Line.** P. M. Mueller. *Iron and Steel Engineer*, v. 22, June '45, pp. 37-46, 57.
Performing a very heavy reduction in a single pass, this mill may fit into a continuous production line with equipment for cleaning, annealing, etc. Experience with two units on non-ferrous production indicates possibilities for the steel industry.

19-201. **Billet Preparations for Rolling Mills.** F. F. Cambest. *Iron & Steel Engineer*, v. 22, June '45, pp. 59-61.
Conditioning is vitally important in the production of high quality products. The best method of conditioning is the prevention of defects in the preceding steps of the process.

19-202. **West Coast Steel Mill.** G. Eldridge Stedman. *Steel*, v. 117, July 2, '45, pp. 108, 110, 158.
Bar and merchant shapes are produced in modern mill.

19-203. **Properties and Workability of 75S Aluminum Alloy.** M. Raskin. *Product Engineering*, v. 16, July '45, pp. 481-483.
Discussion of the heat treatments and forming limitations of high strength 75S aluminum alloy as compared to the 24S alloy, and methods by which difficulties are overcome.

19-204. **Drawing and Ironing ½-In. Magnesium Plate.** J. Walter Gulliksen. *Iron Age*, v. 156, July 5, '45, pp. 74-77.
By heating the magnesium plate to a temperature between 500 and 600° F., it has been found possible to successfully form a domed cup with 52½% reduction in one draw from a ½-in plate. Wall thickness was then reduced 37% by an ironing operation. A complete analysis of all the factors involved is given.

19-205. **The Rolling of Metals: Theory and Experiment.** L. R. Underwood. *Sheet Metal Industries*, v. 21, June '45, pp. 983-991.
Hot rolling tests on ferrous bars; hot rolling tests on aluminum bars; cold rolling tests on aluminum bars; cold rolling tests on copper bars; cold rolling tests on copper strip; cold rolling tests on lead bars; flow of material in cold rolling mild steel strip; discussion of methods for investigating the flow of material in rolling.

19-206. **Practical Problems of Light Presswork Production.** J. A. Grainger. *Sheet Metal Industries*, v. 21, June '45, pp. 1003-1006, 1010.
Compound tools; blank, draw and pierce tools; blank, raise and pierce tools.

19-207. **Tube Fabricating Techniques.** J. S. Adelson and Park Hill. *Steel*, v. 117, July 9, '45, pp. 118, 174.
Precisely fabricated tubular parts will be within reach of most designers for peacetime manufacturing because producers and fabricators are emerging from war experience well equipped to surmount technical difficulties.

19-208. **Hardfaced Dies.** M. Riddihough. *Iron & Steel*, v. 18, June '45, pp. 189-190.
Longer life in hot stamping and drawing operations.

19-209. **Bar and Tube Straightening.** Walter Siegerist. *Iron & Steel*, v. 18, June '45, pp. 199-203.
Theory and methods of modern two, four and six-roll equipment.

19-210. **Stamping and Assembly of Domestic Gas Ranges.** S. J. Szabo. *Steel Processing*, v. 31, June '45, pp. 359-363.
Operation of research laboratory of American Stove Co.

19-211. **The Design of Dies for One-Operation Forming.** C. W. Hinman. *Steel Processing*, v. 31, June '45, pp. 373-378.
Punch and die shown produce work from a flat sheet blank in one stroke of the press ram. Operation details.

19-212. **West Coast Steel Mill.** G. Eldridge Stedman. *Steel*, v. 117, July 16, '45, pp. 134, 136, 174, 176, 178.
Features modern rod mill layout. Facilities and practice at Columbia Steel Co.

19-213. **Cold Impact Extrusion of Aluminum Parts for Douglas Aircraft.** J. R. Boston. *Machinery*, v. 51, July '45, pp. 138-147.
Remarkable results obtained on standard punch presses point toward wide manufacturing economies in various industries.

19-214. **Stretch-Forming Aluminum Alloy Shapes at Willow Run.** Charles O. Herb. *Machinery*, v. 51, July '45, pp. 184-191.
Unique methods developed by Ford engineers to supply the tremendous number of stretched shapes required in building over 8000 four-engine bombers—the same methods are applicable in aluminum fabrication outside of the aircraft industry.

19-215. **Bending.** Wm. C. Tucker. *Machine Tool Blue Book*, v. 41, July '45, pp. 139-140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162.
Treats in a simple way the subject of bending rolled metal shapes on power driven bending rolls. It is important that a distinction should be made between bending and forming. These are two entirely different types of metal working, although closely related and performed on machines employing similar principles. Discussion confined to bending of metal in one plane only, that is, to produce circles, arcs and spirals.

19-216. **Toroidal Winders.** F. E. Planer. *Wire & Wire Products*, v. 20, July '45, pp. 491-493, 496.
Theory developed is regarded as the basis of toroidal winding practice.

20. MACHINING AND MACHINE TOOLS

20-248. **Lathe Production Increased by Multiple-Operation Tooling.** H. E. Shepard. *American Machinist*, v. 89, June 21, '45, pp. 98-101.
Faced with the need for greater machining output, tool engineers adapted a standard engine lathe so semi-automatic chucking could be used.

20-249. **True Circular-Arc Tooth Profiles Provide Accurate Gears.** Ernest Wildhaber. *American Machinist*, v. 89, June 21, '45, pp. 102-104.
Freedom from undercut, a gradual tooth engagement and simple layout result from circular-arc profiles.

20-250. **Carbide-Tipped Cutters Work Well With Heavy Cuts on Cast Steel.** *American Machinist*, v. 89, June 21, '45, pp. 108-109.
Good operators and careful tool grinding contribute to success in introducing negative-rake cutters for use on soft steel.

20-251. **Reamer Eliminates Honing—Discussion.** R. A. Schultz. *American Machinist*, v. 89, June 21, '45, p. 112.
Old end-mill ground to a diameter of 0.500, and with a short lead of about 1/16 in. at 30° and well backed off. Used to ream different materials, it produced really high finish, polished or, more accurately, planished hole.

20-252. **Practical Ideas.** *American Machinist*, v. 89, June 21, '45, pp. 123-128.
Knife-edge shock absorber installed on balancing stand. Broken hacksaw blades make excellent parting tools. Power hammer stopped by brake at top of stroke. Leaks exposed, pipes cleaned by hot water from circulator. Sealed bearings regreased by simple bench tool. Adjustable portable grinder reduces operator's fatigue. Spherical jointed chocks for machinery foundation. Adjustable hat section joggle die for various section depths. Plate bevels flame-cut with hand-operated protractor. Self-priming discharge line for coolant pumps.

20-253. **Finish Boring of Various Materials. I and II.** Bruno Holmstrom. *American Machinist*, v. 89, June 21, '45, pp 129, 131.
Charts show "starting" shapes on carbide-tipped tools for precision boring at high speeds and light cuts. Modifications must be made if speeds are lowered or stock removal is increased.

20-254. **Consolidated Vultee Tooling Shortcuts.** Thomas A. Dickinson. *Tool & Die Journal*, v. 11, June '45, pp. 101-105.
Dural templates insure accurate centers. Redesign cuts tools and operations to less than one-third. Deformed slugs easily removed from openings.

20-255. **Tooling Ways.** Thomas A. Dickinson. *Steel*, v. 116, June 25, '45, pp. 120-121, 162, 164.
Accurate and efficient substitute for the tooling dock in small scale positioning operations aids in constructing small airplane mockups, jig boring tooling plates, and in setting up panel jigs and fixtures. Adaptable to assembly tooling of light airplanes and automobiles.

20-256. **Setup Charts for Automatic Screw Machines.** John J. Meadows. *Iron Age*, v. 155, June 28, '45, pp. 67-72.
Speed and feed change gear charts and high speed drilling and tapping gear ratios presented for 1⅝-in. 6-spindle New Britain-Gridley screw machines.

20-257. **Cork Blanket for the Hydropress.** *Iron Age*, v. 155, June 28, '45, pp. 73-74, 138.
Hydrocork for hydropress forming of aircraft parts, is offered as a low cost tool material for general sheet metal forming. It performs differently than rubber since there is relatively small lateral expansion when a block of this material is subjected to as much as 50% compression.

20-258. **Safety in the Use of Cold Metal Saws.** *Western Metals*, v. 3, June '45, pp. 49-50, 52.
Hazards of metal saws and precautions to be taken in their use.

20-259. **Vapor Blast Liquid Honing Process.** A. H. Eppler. *Western Metals*, v. 3, June '45, pp. 46-48.
Outline of the development of the vapor blast process and how it works.

20-260. **Chip Control When Machining Steel with Carbides.** Einar Almdale. *Western Metals*, v. 3, June '45, pp. 32-33, 35, 37.
Effect of chip breaker on tool life; chip breaker designs; chip breaker types; controlling chips with rake angles; grinding the breaker.

20-261. **Centerless Grinding.** *Automobile Engineer*, v. 35, May '45, pp. 179-181.
Centerless grinder for producing threaded parts direct from solid blanks. When centerless grinding principles are applied to this class of work, very high production rates can be maintained in conjunction with a high standard of precision.

20-262. **Mechanics of the Metal Cutting Process, II. Plasticity Conditions in Orthogonal Cutting.** M. Eugene Merchant. *Journal of Applied Physics*, v. 16, June '45, pp. 318-324.
Analysis of the mechanics of orthogonal cutting with a type 2 chip extended by introducing those physical properties of the work material which control its plastic behavior. One evident plasticity condition is the equality of the shear stress on the plane of shear to the shear strength of the metal.

20-263. **Burnishing at the Automatic.** *Screw Machine Engineering*, v. 6, June '45, pp. 52-56.
Production of a part on a multiple spindle bar automatic which features burnishing of inside and outside diameters in the 4th spindle position.

20-264. **Economy of Machining Light Metals.** Paul Dubosclard. *Light Metal Age*, v. 3, June '45, pp. 15, 34.
Recommendations for machining light metals—for feed speeds, for cutter speeds and arrangement of cutter teeth. Comparison is made with steel machining conditions.

20-265. **Seabee Machine Tools.** *Steel*, v. 117, July 2, '45, pp. 102, 154.
Tells how Seabees speed repair of American equipment with makeshift, captured tools.

20-266. **Designing for Milling.** Paul Dutter. *Industrial Aviation*, v. 3, July '45, pp. 47-48, 50.
Basic rules to be considered when designing for the machine shop which will eliminate drawing changes and reduce production time and rejection of parts.

20-267. **Machinability of Cast Magnesium Ingots.** L. R. Jackson and W. W. Beaver. *Industrial Aviation*, v. 3, July '45, pp. 54-55, 97.
Machinability test developed which may be used for investigating the cleanliness of ingots used in making aircraft castings.

20-268. **Radial Rake Angles in Face Milling, II.** J. B. Armitage and A. O. Schmidt. *Mechanical Engineering*, v. 67, July '45, pp. 453-456.
Tool wear, chip formation, and cutting speed in carbide-steel milling.

20-269. **Indicated Principles of Postwar Machining.** Carl Himmelright. *Mechanical Engineering*, v. 67, July '45, pp. 473-474, 479.
Trends in machining practice; designing tooling and fixtures for close-tolerance work; cutting-tool development.

20-270. **Setup Charts for Automatic Screw Machines.** John J. Meadows. *Iron Age*, v. 156, July 5, '45, pp. 63-71.
Charts for the graphical solution of problems involving speeds and feeds on Davenport and Brown & Sharpe automatic screw machines. The charts are particularly useful because the lack of direct relationship of feed per spindle revolution makes a series of approximations necessary, ordinarily involving repeated calculations, which are herein eliminated.

The DoALL has been educated to do more than regular run-of-mill surface grinding jobs. It has been designed to do all kinds of precision tool room and laboratory work.

Each DoALL has a diploma — its own tag and test bar, giving in micro inches the finish it will produce.

Its weight (2200 pounds, about twice that of other tool room grinders) absorbs vibration and provides a pillar of strength for the scientifically balanced mechanism. Knee room enables operator to sit and watch the work at close range. In a very short time, even a beginner can turn out perfect finishes.

Think of this — one small manufacturer used a DoALL for 58 separate grinding operations on one product.

Send for circular giving specifications and data on auxiliary equipment, magnetic chuck, selectron, coolant unit, dust collector, etc.

TELEPHONE YOUR DoALL SALES AND SERVICE STORE OR WRITE FOR LITERATURE

The DoALL Company Minneapolis 4 Minnesota

Mention R-162 When Writing or Using Reader Service.

A.S.M. Review of Current Metal Literature — *Continued*

20-271. Progressive-Die Principle Applied to Production Milling. E. S. *Machinery* (London), v. 66, May 24, '45, p. 563.

Milling machine equipped with a fixture designed to apply this familiar progressive-die principle to production milling of small parts from bar or rod stock. Bar stock is clamped in the fixture. At every feeding movement of the milling machine table, each of the four cutters removes metal from the bar.

20-272. Standard Punch and Die Holders. P. L. Evans. *Machinery* (London), v. 66, May 24, '45, pp. 568-570.

All the standard holders described have given excellent service, effecting a considerable saving in material, machining, tool making and drafting time.

20-273. Wheel Truing for Fine Grinding. H. J. Wills and H. J. Ingram. *Machinery* (London), v. 66, May 24, '45, pp. 573-574.

In truing it is preferable to bring the truing tool almost to the highest part of the wheel face and then start the in-feed at 0.001 in. per pass. This will prevent gouging, wheel marks, and damage to the truing tool.

20-274. Some Facts About Master Gears. G. H. Sanborn. *American Machinist*, v. 89, July 5, '45, pp. 116-117.

Master gears need not be super-precise if the inspection method is wisely chosen. Gear manufacturers better off if they employ masters in a way that avoids exact overpin dimensions.

20-275. Compound Sine Plate Simplifies Difficult Positioning Problems. E. J. Chartier. *American Machinist*, v. 89, July 5, '45, pp. 122-123.

Typical set-ups by machinists often involve setting work at odd angles to working surfaces of machines. An illustration of this difficulty is solved by use of the compound sine plate.

20-276. Cemented-Carbide Bearings Facilitate Continuous High-Speed Grinding. James R. Longwell. *American Machinist*, v. 89, July 5, '45, pp. 128-129.

Where conditions of overload, excessive wear and shaft play exist, cemented carbides offer a solution and reduce overhead.

20-277. Practical Ideas. *American Machinist*, v. 89, July 5, '45, pp. 135-140.

Blanking dies built up to desired height with steel packing blocks. Fitting edge of plate burnt for Unionmelt welds. Bandsaw miter box permits cutting matched joints. Nut threads finished on small lathe with sizing die. Internal lathe collet stop locates short pieces accurately. Gears in hobbing machine checked with planer gage. Heavy brake forms ends of sheets in one stroke. Set-up table used for checking gang mill assemblies. Piston-ring burrs removed by automatic chamfering machine. Stud extractor removes stubborn studs without breakage. Power driven kick press reduces operator fatigue.

20-278. Worm Gear Deflection. Harry Walker. *Automobile Engineer*, v. 35, June '45, pp. 239-244.

Effect of deflection on the performance of the gears is analysed, and a technique for cutting worm gears to allow for deflection is described. Oversize hob used for cutting the wheels and its lead differs from that of the worm. The method is such that the concentration of load and heavy initial wear normally caused by deflection are avoided and a closer approach to uniform angular velocity transmission is obtained under deflected conditions.

20-279. Cemented Carbides. *Automobile Engineer*, v. 35, June '45, pp. 252-253.

American developments in the use of mechanically mounted blades.

20-280. Developments in Gear Cutting and Finishing Processes. E. J. Everest. *Machinery* (London), v. 66, May 31, '45, pp. 593-594.

Bevel gears; worm gear; double-helical gears; hobbing process; shaving process; effect of angle between axes; increased rate of cutting by carbides.

20-281. Milling Forged Cylinder Heads. *Steel*, v. 117, July 9, '45, pp. 114, 116.

New method features complete automatic cycle after loading through combined hydraulic and electronic control of cutter head.

20-282. Multiple Tapping of Magnesium and Aluminum. Charles O. Herb. *Machinery*, v. 51, July '45, pp. 178-183, 202.

How thoughtful consideration of a troublesome problem effected large economies in aircraft engine manufacture.

20-283. Machining Operations in Building Superfortresses to Bomb Japan. Earl Delaney. *Machinery*, v. 51, July '45, pp. 192-200.

Typical operations in one of the progressive machine shops of the aircraft industry that have resulted in large production economies.

20-284. Crankcase Production for the Napier Sabre Engine. *Machinery* (London), v. 66, June 7, '45, pp. 613-620.

Machining operations on the two castings are almost identical. Some 178 machining operations are employed for each casting; operations described.

20-285. Tooling for P-38 Production. Howard Campbell. *Modern Machine Shop*, v. 18, July '45, pp. 124-132, 134.

Concise description of the tools and methods used in the building of the Lockheed "Lightning" P-38.

20-286. Improved Machining Characteristics of Leaded Steels. *Modern Machine Shop*, v. 18, July '45, pp. 152, 154, 156, 158, 160, 162, 164, 166, 168.

Review of the characteristics of the leaded steels that have been available in Britain in recent years. Improved machining characteristics of the steels, as compared with non-leaded steels, have led to claims of marked increases in the rate of output of many different products.

20-287. Ideas from Readers. *Modern Machine Shop*, v. 18, July '45, pp. 186, 188, 190, 192, 194, 196, 198, 200.

A good tool for contour boring, by A. C. Schmidt. Lathe chuck stand. High production reaming, by R. A. Shaw. Special chuck to machine caps, by Michael Axler. Convair develops precision drill tool. Rack for plug gages.

20-288. The Art of Metal Cutting, Part VIII. *Machine Tool Blue Book*, v. 41, July '45, pp. 169-170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190.

Carbide milling of steel.

20-289. General Tooling-Type and Accuracy Including the Design of Detail Tools and Simple Assembly Fixtures. B. G. L. Jackman. *Sheet Metal Industries*, v. 21, June '45, pp. 1021-1030, 1036.

General notes on tooling principles.

20-290. Carbide Techniques at Criterion. *Western Machinery & Steel World*, v. 36, June '45, pp. 248-249, 263.

From diamonds to precision parts; ability of carbide to cut heat treated steels rapidly makes possible the use of treated forgings and bar stock and eliminates cuts prior to heat treatment.

20-291. Bevel Mill Speeds Aircraft Production. *Western Machinery & Steel World*, v. 36, June '45, pp. 258-259, 287.

Cutting of scarfs or bevels on wing skins; purpose of operation is to make a smooth joint which will seal tightly when riveted and permit uninterrupted flow of air over the surface.

20-292. Selecting Carbides for Milling. Fred W. Lucht. *Western Machinery & Steel World*, v. 36, June '45, pp. 267, 275.

Steel milling; milling cast and malleable irons; other materials; aluminum alloys.

20-293. Diamond Cutting Accelerated by an Electric Arc. Chauncey G. Peters, Karl F. Nefflen, and Forest K. Harris. National Bureau of Standards *Journal of Research*, v. 34, June '45, pp. 587-593.

By producing a high-voltage electric arc at the contact between the diamond and the lap, cutting rate is materially increased for all orientations of the diamond, and good progress can be made directly on a natural octahedron face, where cutting without the arc is almost impossible. By applying the arc to a diamond saw the sawing rate is greatly increased, and diamonds can be sawed regardless of the orientation of the cut relative to the crystal axes. 5 ref.

20-294. Tumble-Burring on an Engineering Basis. Herbert Chase. *Wings*, v. 4. July '45, pp. 1628-1631.

Standardized procedures in improved barrels permit a wide variety of parts to be handled in minimum time, saving thousands of hours of hand-burring. Gears and threaded parts, as well as large and small castings are successfully treated. Edges are rounded uniformly.

20-295. High Speed Drilling, Reaming, Tapping. G. W. Birdsall. *Steel*, v. 117, July 16, '45, pp. 112-115, 154, 156, 159, 160.

Exceptionally efficient hole production methods employ new developments. Semi-automatic setups are individual motor-driven heads equipped with a feeding device centrifugally powered and controlled.

20-296. Favored Practice in Machining Zinc Alloy Die Casting, Part 7. *Die Casting*, v. 3, July '45, pp. 61-62, 64-67.

Sawing; spinning; swaging; riveting and staking; gear cutting; filing and burring; punching and shearing; bending and forming; addenda on diamond boring.

20-297. Design of Machine Tools for Safety and Production. A. William Meyer. *Product Engineering*, v. 16, July '45, pp. 476-480.

Features that should receive careful consideration in the design of machine tools to provide safety for operators and maintenance men, to prevent overloads caused by improper handling, to reduce manual effort required to manipulate controls, to insure uninterrupted production and to increase the efficiency of operators.

20-298. Precision Machine Work for Interchangeability Assembly. Wallace A. Scotten. *Production Engineering and Management*, v. 16, July '45, pp. 67-70.

Rotol job has unusual tool setups on turning operations. Extreme tolerances are maintained on gear finishing, in final assembly, inspection and testing of completed gear trains and boxes.

20-299. Coated Abrasives Applied to Metal Removal. I. L. Halstead. *Production Engineering and Management*, v. 16, July '45, pp. 71-73.

New uses for abrasives; coated abrasives excell.

20-300. Cutting Costs with Better Tooling. *Production Engineering and Management*, v. 16, July '45, pp. 80-88.

Fixtures with greater versatility and improved accuracy lessened down-time for setups and increased productive capacity of standard machines at General Mills.

20-301. Increasing the Range of Small Precision Lathes. John E. Hyler. *Production Engineering and Management*, v. 16, July '45, pp. 89-92.

Typical of the broader application of small lathes to a variety of work, formerly considered to be outside their field of usefulness, are grinding and thread cutting operations. High production performance of these processes has been made possible by the addition of standard accessories. Available accessories are described and the adaptability of the small lathe to competitive manufacturing is suggested by a further outline of its versatility.

20-302. The Twin Disc Segment Saw. Jack L. McGraw. *Modern Industrial Press*, v. 7, June '45, pp. 26, 36.

High production warranted the creation of a mechanized, precision sawing machine which would locate and trim the three segments speedily, accurately, economically, and incorporate automatic facility features which would also permit women workers to operate it with minimum handling. Deviation of as much as 0.010 in. from the loft contour while the skin is being trimmed produces mis-matches of some variety. A 1/32-in. constant gap must be maintained between all segments, so the skin must be held exact and the cut must be truly radial all along the width of 16¾ in.

20-303. Machining Light Alloys. *Aircraft Production*, v. 7, June '45, p. 265.

Use of high speed flycutters on thin die castings.

20-304. Modern Machine Tools. *Aircraft Production*, v. 7, June '45, pp. 284-286.

Rotor turning; worm machining; centerless lapping.

20-305. High-Speed Milling. *Aircraft Production*, v. 7, June '45, p. 296.

Hints for firms considering the adoption of carbide-tipped cutters.

21. LUBRICATION AND FRICTION; BEARINGS

21-54. Machine Tool Lubrication. William H. Oldacre. *Tool Engineer*, v. 14, May '45, pp. 43-45.

Increased production, higher quality, lower costs possible with correct lubrication, starting with machine tool design.

21-55. Additives Improve Hydraulic Oils. W. G. Huebler. *American Machinist*, v. 89, June 21, '45, pp. 110-112.

Hydraulic headaches are often caused by conditions beyond the control of the oil supplier or the manufacturer of the machine. Providing the cure before the trouble exists is the function of hydraulic additive agents.

21-56. The Frictional Properties of Some White Metal Bearing Alloys: The Role of the Matrix and the Hard Particles. D. Tabor. *Journal of Applied Psysics*, v. 16, June '45, pp. 325-337.

Experiments on a typical lead-base bearing alloy which consists of a soft matrix in which are dispersed numerous hard crystallites. Measurements of the friction were made at room temperature and at elevated temperatures for clean and for lubricated surfaces. Comparison with a special alloy consisting of the matrix material alone, showed that the hard particles played no appreciable part in the basic frictional and wear properties of the bearing alloy. Experiments are described on a typical tin-base bearing alloy and a corresponding tin-base "matrix" alloy.

21-57. Bonded Marine Type Bearings. C. L. Thompson. *Pig Iron Rough Notes*, no. 99, Spring-Summer, '45, pp. 6-9.

Federated method of bearing bonds. Inside of the bearing is machined on surface and roughed to provide a suitable bonding base, by using a sharp "V" shaped tool on the final cut. No oil or cutting compound is utilized for the boring of the shell. Shell is then removed from the machine and tinned. The machined shell is submerged completely in a boiling solution of alkaline cleaner to remove traces of dirt, grease, and grime, then submerged in a 50-50 hydrochloric acid solution at a temperature between 160 and 180° F. and etched.

21-58. The Tri-Alloy Bearing. *Automobile Engineer*, v. 35, May '45, pp. 195-197.

Tri-alloy bearing with a service life of two to three times that of a conventional bearing; composed of 4½ to 5% silver, 35 to 40% lead and the balance copper, with a trace of iron.

21-59. The Use of Coolants in Grinding Fine Surfaces. H. J. Wills and H. J. Ingram. *Machinery* (London), v. 66, June 7, '45, pp. 623-626.

Characteristics of ideal coolant for fine grinding; soluble-oil coolants; advantages of filters and settling tanks.

21-60. Cutting Fluids and Their Use in the Industry. R. I. Mahan. *Western Machinery & Steel World*, v. 36, June '45, pp. 260-263, 274.

Selection of the type of cutting fluid to be used generally depends upon the work piece, type of operation, and kind of cutting tool used. Kind of cutting tool that is used affects greatly the selection of the cutting fluid.

21-61. Symposium on Neutralization Number. American Society for Testing Materials *Bulletin*, no. 134, May '45, pp. 48-57.

Neutralization number from the viewpoint of the industrial engineer; neutralization number from the viewpoint of the turbine engineer; neutralization number from the viewpoint of the automotive engineer; a comparison of the salt method with A.S.T.M. method for determining the acidity of lubricating oils.

22. JOINING

Welding; Brazing; Flame Cutting; Riveting

22-368. Control of Distortion in Arc Welding. J. R. Morrill. *Iron Age*, v. 155, June 28, '45, pp. 77-80.

Three simple rules for controlling distortion interpreted in terms of specific "do's" and "dont's."

22-369. Application of Cold Driven Riveting Process. H. G. Debald. *Fasteners*, v. 2, no. 2, '45, pp. 14-15.

Cold driven rivets used in the fabrication of many structures for flood control projects, with very satisfactory results.

22-370. Riveted Fabrication Used for Long Span Girders of Foster's Ferry Bridge in Alabama. W. N. Woodbury. *Fasteners*, v. 2, no. 2, '45, pp. 16-18.

Of riveted construction throughout, Foster's Ferry Bridge over the Black Warrior River near Tuscaloosa, Ala., represents a fine solution of a difficult problem in roadway grades and economic spacing of piers.

22-371. Brazing With Electric Induction Heat. A. M. Setapen. *Steel*, v. 117, July 2, '45, pp. 92-95, 130, 132, 134, 136, 138.

Describes in detail how to join parts with silver-base alloys.

22-372. Soldering Aluminum. *Automobile Engineer*, v. 35, May '45, pp. 193-195.

Soldering alloys; soldering fluxes; removal of flux after soldering; soldering methods; practical hints on soldering aluminum; mechanical properties of soldered light alloy joints. 5 ref.

22-373. Resistance Welding Aluminum. E. T. Hughes. *Light Metal Age*, v. 3, June '45, pp. 12-14.

Methods and equipment used in resistance welding of aluminum. Recommendations are made for obtaining best results. 7 ref.

22-374. Cutting Metal With the Electric Arc. *Modern Machine Shop*, v. 18, July '45, pp. 138, 140, 142, 144, 146.

How to cut rivet heads or pierced holes with arc welder.

(Continued on page 14)

A.S.M. Review of Current Metal Literature — *Continued*

22. JOINING (*Cont.*)

22-375. **Welding and Brazing of Stamped Parts.** *Western Machinery & Steel World*, v. 36, June '45, pp. 264-266.

Pressed metal manufacturers may select one of several methods of joining for the particular job. Welding may be accomplished by either electric or gas, manual or automatic procedure. Two types of brazing may be employed—low temperature atmospheric brazing and high temperature controlled atmosphere brazing. All are discussed.

22-376. **Silver-Brazing Production Methods at North American.** Ralph H. Ruud. *Machinery*, v. 51, July '45, pp. 162-169, 201.

Induction heating, gas furnace, and hot dipping methods are all employed by a concern that has established a reputation for high quality brazed work.

22-377. **Heliarc Welding of Aircraft Fuel Tanks.** W. S. Evans. *Machinery*, v. 51, July '45, pp. 170-177.

How engineers of the Curtiss-Wright Corp. solved the problem of designing and fabricating leakproof aluminum alloy fuel tanks for transport planes.

22-378. **Use of Metallic Arc Welding in Fabricating Pressure Vessels.** Charles M. Scudder and John J. Chyle. *Railway Mechanical Engineer*, v. 119, July '45, pp. 288-291.

Many steps in building of unfired vessels by welding applicable to locomotive boilers—good engineering and shop practice essential.

22-379. **Fabrication of Gondolas.** *Railway Mechanical Engineer*, v. 119, July '45, pp. 283-285, 291-292.

50-ton all-purpose composite gondolas are built by welding at the Milwaukee shops. Production is eight cars a day.

22-380. **Observations on the Appearance Welding of Malleable Castings.** H. A. Schwartz, Ira Young, and James Hedberg. American Society for Testing Materials, Preprint 31, 1945, 9 pp.

Repair, by welding, of surface defects. Within the limitations of this paper, such welds need be ductile enough to permit of very moderate deformation and soft enough to permit machining at speeds comparable with those used on malleable iron. Reference to commercial machining on welds made by a promising technique.

22-381. **Phototube-Controlled Flame Cutter.** David S. Walker. *Electronics*, v. 18, July '45, pp. 100-103.

Electronic control makes possible accurate oxyacetylene cutting of large steel sheets on a mass production basis, using photo-electric scanning of small master drums in place of conventional contour tracing of costly full-size master patterns.

22-382. **Elongation in Aircraft Spars Caused by Riveting Operations.** C. H. Smith. *Product Engineering*, v. 16, July '45, pp. 471-473.

Effects of drilling, rivet expansion and pressure of heading on the misalignment of holes and the elongation in long aircraft spars for different ratios of rivet length to diameter and different thicknesses of material. When material thickness is small in comparison with rivet diameter. tests show that the elongation is not related to material thickness.

22-383. **Strength of Spot Welds in 75S Aluminum Alloy.** *Product Engineering*. v. 16, July '45, p. 484.

Spot welding tests by Consolidated Vultee Aircraft Corp. on 75S aluminum alloy after both solution heat treatment (the "W" condition). and after complete heat treatment (the "T" condition), show that satisfactory welds with consistent strength can be made without establishing optimum welding machine settings for different gages of material.

22-384. **The Welding of Non-Ferrous Metals, Part 5.** E. G. West. *Sheet Metal Industries*, v. 21, June '45, pp. 1057-1063.

Arc welding processes.

22-385. **A Summary of Observations of Cracking in Spot Welds in Alclad 24S-T.** Robert A. Wyant. *Sheet Metal Industries*, v. 21, June '45, pp. 1067-1068, 1072.

Summarizes the information on cracking that has been more fully discussed in the progress reports from the laboratory. (From *Welding Journal*.)

22-386. **Flash and Butt Welding Light Gage Ferrous and Non-Ferrous Metals.** T. Watson and A. J. Hipperson. *Welding*, v. 13, June '45, pp. 188-197.

Details of a recently established method which has been found completely efficient. Flash-butt welding of light gage steel and development work on thin sections of brass. 2 ref.

22-387. **A Welding Repair Business.** E. H. Christie. *Welding*, v. 13, June '45, pp. 210-213.

How it can be started today. Licenses; plant required; accessories; capital required; business procedure and records; assessment of overheads; welding repair to casting; job cards.

22-388. **Merchant Shipbuilding.** Amos L. Ayre. *Welding*, v. 13, June '45, pp. 214-216.

Expanding use which has been made of welding in the construction of merchant vessels.

22-389. **Multi-Storey Buildings.** J. Corston Mackain. *Welding*, v. 13, June '45. pp. 217-223.

Extensions to present constructions. Explains how welding was used to carry out vertical extensions on an existing building.

22-390. **Welding of Thin Gage Sheet.** H. W. Dear. *Welding*. v. 13, June '45, p. 223.

Method adopted to reduce distortion.

22-391. **Welding Aluminum-Magnesium Alloys.** W. K. B. Marshall. Institute of Welding *Transactions*, v. 8, May '45, pp. 53-57.

Experiences in solving one specific problem which was met in welding 3% magnesium alloy. It is a problem which may be encountered in any fabricating process in which working and annealing is followed by welding.

22-392. **Hard Surfacing by Welding.** Maurice Riddihough. Institute of Welding *Transactions*, v. 8, May '45, pp. 58-62.

Outlines the types of alloy rod called for by major industries and the conditions they encounter in service. The available hard-facing alloys are grouped in four headings: under 20% alloy. more than 20% alloy. non-ferrous alloys, tungsten carbides; typical analyses are given. The technique of hard-facing is discussed in relation to cracking and deformation and detailed heat treatment recommendations are given for most types of steel. 5 ref.

22-393. **Application of Welding to Steel Structures.** R. G. Braithwaite. Institute of Welding *Transactions*, v. 8, May '45, pp. 63-67.

Properly designed welded structures will show a saving of from 15 to 20% of the weight of similar riveted structures but the cost rarely shows more than 5% saving, and in many cases the work is actually dearer. While the general design of the structures has been sound in conception, the economy has been lost through the incorrect treatment of the joints. Discusses some joint details from the point of view of the fabricator.

22-394. **Influence of Sulphur and Phosphorus on Weldability of Mild Steel.** L. Reeve. Institute of Welding *Transactions*, v. 8, May '45, pp. 80-88.

Cracking in the weld during welding of mild steel is sometimes encountered, and has been attributed both to the steel and the electrode. Reports certain observations on the influence of sulphur, phosphorus, and, to a lesser extent, carbon, on the cracking tendency of mild steel weld metal, and the influence of the type of electrode on this phenomenon. 13 ret.

22-395. **Testing Welded Structures by the Tee-Bend Test.** Leon C. Bibber and Julius Heuschkel. *Steel*, v. 117, July 16, '45, pp. 124, 126, 164, 166, 168, 170, 173.

Performance of the toes of fillet welds under severe concentrations of stress in the tee joint is studied in the laboratory by an improved tee-bend test which simulates severe conditions such as encountered by welded ships.

22-396. **Resistance Welding Laboratory Facilities.** R. T. Gillette. *General Electric Review*, v. 48, July '45, pp. 26-29.

How a manufacturer benefits by having his own laboratory. Types of equipment needed.

22-397. **Self-Forging Welder.** C. H. Strange. *Electronic Industries*, v. 4, July '45, pp. 109, 166, 170.

Damped oscillatory discharge using air core welding transformer prevents residual magnetism difficulties.

22-398. **Some Safety Factors in Arc Welding.** R. F. Wyer. *Railway Engineering and Maintenance*, v. 41, July '45, pp. 670-673.

Hazards involved and the safety practices that should be observed in arc welding work. Also explains that, contrary to popular belief, arc welding is not a hazardous occupation, if the work is done in accordance with sound safety rules.

22-399. **Electronics—Welding Control.** Clark E. Jackson. *Modern Metals*, v. 1, July '45, pp. 20-21, 23.

Outlines different types of welding and some of the factors contributing to efficient operation.

22-400. **Brazing.** Lawrence D. Jennings. *Aircraft Production*, v. 7, June '45, pp. 294-296.

Types of points and processes.

22-401. **Electronic Control.** *Aircraft Production*, v. 7, June '45, pp. 261-265.

Application of electronic control to two sheet metal joining processes — electric resistance welding and riveting—is briefly reviewed and an indication given of its advantages in the automatic control and coordination of variable factors.

22-402. **Designing of "Trouble-Free" Dies, XLVIX.** C. W. Hinman. *Modern Industrial Press*, v. 7, June '45, pp. 22, 30.

Welding for the war and peace.

22-403. **Building-up and Hard Surfacing by Welding.** William Andrews. Institution of Mechanical Engineers *Journal*, v. 152, June '45, pp. 1-4.

Describes the process of using fusion welding for renewing worn or corroded parts and points out that it can equally well form part of the original design for many structures. Characteristics of the various welding processes are considered from the point of view of the materials with which they may be concerned, and the features of the metallic arc process are considered in some detail. Some illustrations of the type of weld deposit practicable are considered, and the more limited developments in the non-ferrous metals and "super-hard" alloys are referred to. 10 ref.

22-404. **Flash Welding Rings.** I. A. Oehler and Robert E. Goodman. *Welding Engineer*, v. 30, July '45, pp. 44-47.

American Welding Co. specializes in the fabrication of steel rings and bands, flash-butt welded on controlled welders. Developed many interesting techniques to insure customers fast production and high quality.

22-405. **Pipe Lines for "Pluto".** *Welding Engineer*, v. 30, July '45, pp. 49-51.

Ingenuity in the design of "Hais" cable and "Hamel" welded steel pipe for Operation Pluto-Pipe Lines under the ocean.

22-406. **America's Answer—the JB-2.** T. B. Jefferson. *Welding Engineer*. v. 30, July '45, pp. 52, 54, 56.

Buzz bombs being built in America. Nazi V-1 was an excellent product, but the all-welded engine of the JB-2 is even better.

23. INDUSTRIAL USES AND APPLICATIONS

23-154. **Bug Bombs.** *Steel*, v. 116, June 25, '45, pp. 118-119, 156, 160.

Production of small but mighty "bombs" used to spray insecticides requires some unusual techniques to insure both light weight and resistance to high pressures. Peacetime market being studied.

23-155. **Sheet Lead on State Capitol Dome.** *Sheet Metal Worker*, v. 36, June '45, pp. 47-49.

Application of lead to Pennsylvania Capitol dome typical of proper installation practice for sheet lead work.

23-156. **Air Supported Roof of Aluminum.** Herbert H. Stevens, Jr. *Aluminum and Magnesium*, v. 1, June '45, pp. 25, 41.

New methods of construction using air pressure in place of beams and columns to support the roof of large buildings promises a new and tremendous outlet for the use of aluminum.

23-157. **Chilled Tread Wheels for Freight Cars.** William E. Turner. *Pig Iron Rough Notes*, no. 99, Spring-Summer, '45, pp. 10-16.

Standard sizes; chemical composition; specified weights; production and standards.

23-158. **Light Metals in Fire-Fighting Equipment.** *Light Metals*, v. 8, June '45, pp. 271-277.

Theory and practice of applications of light and ultra-light alloys in the construction of fire escapes, pumps and miscellaneous equipment.

23-159. **Aluminum and Magnesium in the Electrical Industries.** *Light Metals*, v. 8, June '45, pp. 278-287.

Light alloys in electro-technology. Russian work on soldered joints in aluminum reviewed. 6 ref.

23-160. **Light Alloys in Rectifiers, Photocells and Condensers.** *Light Metals*, v. 8, June '45, pp. 292-304.

Detailed survey of fixed paper condensers. A comparative study presented of the uses of tin foils in various forms, and of aluminum foils.

23-161. **Aluminum—During the War and After.** P. V. Faragher. *Iron & Steel Engineer*, v. 22, June '45, pp. 76-79.

Aluminum, with capacity built up by war demands and with broadened knowledge and experience, looks to postwar applications with optimism.

23-162. **Blackheart Malleable Iron Castings Used on New Sydney Graving Dock.** *Metallurgia*, v. 32, May '45, pp. 7-8.

Where strength, ductility, machinability and resistance to shock are important considerations, malleable iron castings find a wide field of industrial applications. Production methods developed in recent years have greatly increased the size of malleable castings as is indicated by the description of the application of Blackheart malleable cast iron to the production of large and heavy castings.

23-163. **Some Applications of Welded Aircraft Tubing.** J. S. Adelson and Park Hill. *Sheet Metal Industries*, v. 21, June '45, pp. 1064-1066.

Deals with alloy 4130 and 8630 tubing for motor mounts, low carbon tubing for intake tubes and stainless tubing for exhaust stacks; engine mounts; aircraft intake tubes; aircraft exhaust header; sizing and facing operations.

23-164. **The Battleship's Nerve System.** H. A. Cowan. *Die Casting*, v. 3, July '45, pp. 22-24, 39-40.

In the redesign of this equipment with die casting no less than 46 piece parts were eliminated. On the manufacture of 2000 units it was possible to liquidate the cost of tools and in addition show a savings of 20%. Direct labor and material costs showed a decrease of 70% and 23% respectively.

23-165. **Styling the G-Suit.** Raymond Fenner. *Die Casting*, v. 3, July '45, pp. 26-28, 38-39.

A flying suit known as the "G-Suit" has been developed which utilizes an ingeniously designed valve constructed of die castings.

23-166. **Die Castings Meet Competition in the Electrical Home Appliance Field.** *Die Casting*, v. 3, July '45, pp. 30, 32-34, 36-38.

Home appliance manufacturers are among the largest users of die castings. This production method has been selected for its obvious advantages of low unit costs, uniformity of parts, minimum machining, ease of part finishing. Die castings will be used even more extensively in the postwar appliances now being designed.

23-167. **Industry's Permanent Pull.** Fred P. Peters. *Scientific American*, v. 173, July '45, pp. 36, 38-39, 49.

Modern permanent magnetic alloys, two to ten times more powerful than former materials, are responsible for compact, efficient wartime energy-converting devices and will be the key elements in many post-war electrical and electronic products.

23-168. **Bridges of Aluminum.** *Modern Metals*, v. 1, July '45, pp. 4-5.

"Behind-the-scene" problems and how they were handled by a manufacturer of the Army's M-4 aluminum bridge.

23-169. **Light Metals and Personal Flying.** Frederick H. Roever. *Modern Metals*, v. 1, July '45, pp. 10-12.

Points out that light metals have distinct appeal and gives factors which will contribute to this new industry.

23-170. **Opportunities for Magnesium in the Petroleum Industry.** *Modern Metals*, v. 1, July '45, p. 13.

Petroleum industry offers several good applications for magnesium products. Listed are a few of these possibilities.

23-171. **Light Metal Seating.** *Modern Metals*, v. 1, July '45, pp. 14-15.

Variety of seats, constructed primarily of aluminum and magnesium products, may set the pace for postwar seating in homes and offices. Not only because they are light in weight, but also because they were designed for prolonged comfort and to permit adjustability.

23-172. **Wire Sound Recorder.** *Modern Metals*, v. 1, July '45, pp. 16-17.

Magnetic wire sound recorder. Application for light metals because its main use may be in a small unit, capable of being easily carried around.

23-173. **Magnesium Griddles.** *Modern Metals*, v. 1, July '45, p. 19.

Greasing is unnecessary; they heat up evenly and rapidly and are very light. It might be a logical product for organizations seeking new postwar markets.

23-174. **NE Steels for Bearings and Bolts in Farm Equipment.** J. H. Clark, J. D. Walker and A. S. Jameson. *Metal Progress*, v. 48, July '45, pp. 97-104.

Describes a few specific parts which are of interest to metallurgists generally. Article confines itself to the steels used in roller bearings and bolts.

23-175. **Technics of Tins.** R. T. Colgate. Society of Chemical Industry *Journal*, v. 64, June 16, '45, pp. 186-188.

Scientific application to purchase and maintenance of biscuit tins; relation of manufacture of strip steel to tin plate industry; spectacular advances in electrotinning of strip steel in America.

23-176. **Post-War Finishes for Light Metal Transportation Equipment.** Louise C. Mann. *American Paint Journal*, v. 29, July 9, '45, pp. 43, 46-47, 50.

Structural use of light metals in the post-war era. To what extent will they be used by the railroads? Whether economies in operating cost are sufficient to make up for the higher original cost.

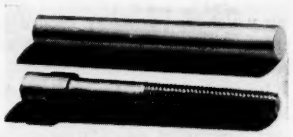
(Continued on page 17)

NEW PRODUCTS IN REVIEW

FREE CUTTING COPPER ROD

Revere Copper and Brass, Inc.
230 Park Ave., New York 17, N. Y.

A superior free cutting copper rod of the tellurium-bearing type with greatly improved machinability has been added recently by Revere. Properties of this new product not only satisfy the varied demands for such a rod in the radar and electronic fields, to name two, but meet as well the demand for a free machining copper rod in the electrical industry and among welding equipment and screw machinery manufacturers.



This is an oxygen-free, high conductivity copper containing a small amount of tellurium, which greatly increases the speed with which the metal can be machined, makes closer tolerances possible, and improves the finish of the completed parts. Revere's free cutting copper machines to brittle chips which break readily and clear from the tools without special attention, or for that matter, without attention of any kind, in contrast to the long tough stringers characteristic of electrolytic copper.

Free cutting copper rod is available in all sizes up to 2 in. in diameter; and in all usual shapes.

Mention R-163 When Writing or Using Reader Service.

RECORDING DENSITOMETER

Triplett and Barton, Inc., Burbank, Calif.

A new recording desitometer that virtually sees and thinks, and instantly writes, is being shown by this company. The electrically operated apparatus automatically computes a true, logarithmic graph of its findings, completing in 30 sec. a permanent curve that formerly required a number of individual hand operations and involved the risk element of human error. Particularly valuable for detecting variations in photographic or radiographic

film, the principle of operation can be utilized in any field where variations in the subject can be detected by electronics.

Prototype tests extending over several months have definitely established that the unit affords greatly increased production possibilities, since it eliminates the prodigious effort formerly required in plotting sensitometric strips. Automatic plotting not only saves a great deal of labor but also makes possible a much more accurate graphical representation of the data.

The instrument was designed and built by the Electrical Research Division of Western Electric Co. and Leeds and Northrup Co. to meet specification requirements developed by Triplett and Barton, Inc.

Mention R-164 When Writing or Using Reader Service.

MOST POWERFUL HIGH FREQUENCY TUBE

Federal Telephone and Radio Corp.
67 Broad St., New York 4, N. Y.

The most powerful high frequency tube, with an output of 200 kw., is being manufactured for use in industrial heating applications. Incorporating a low inductance grid lead, with complete shielding between filament and plate, the new tube has three electrodes, and an available thermionic emission of 120 amperes.

Specifications for the tube set the power output at 200 kw. per tube when operated as an oscillator or in Class C telegraphy, with a plate voltage of 18 kv. and a plate dissipation of 150 kw. In operation as a Class C plate modulated amplifier, the carrier power output is set at 100 kw. per tube with a plate voltage of 12.5 kv., the peak instantaneous power output at full modulation being 400 kw. per tube.

Cooling of the tube is accomplished by water, a steady flow of 40 gal. per min. being required for this purpose. Sixty pounds of copper are used in the construction of the anode block, and the completed tube weighs about 100 lb.

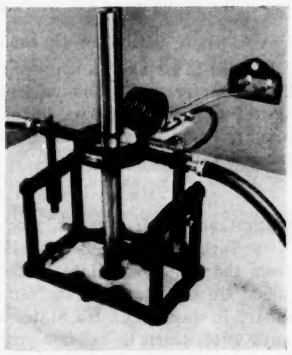
The tremendous power available at these frequencies will open many new fields for industrial use in high frequency heating applications.

Mention R-165 When Writing or Using Reader Service.

CONTINUOUS SURFACE HARDENING OF SHAFTING AND TUBING

Lepel High Frequency Laboratories, Inc.
39 W. 60th St., New York 23, N. Y.

New process for continuous, progressive heating and quenching in the surface hardening of shafting and tubing of any length is announced by this company. As the shaft or tube moves at a predetermined speed through the heating and quenching coils, it is rotated slowly, developing the highest degree of uniformity in the hardened surface consistent with the chemistry of the steel.



With the high frequencies developed by Lepel spark-gap operated equipment —100,000 to 450,000 cycles—heating is so rapid and the time at heat so short that even normal grain growth does not take place. This makes it possible to use ordinary carbon steel in many applications where alloys heretofore have been required. The process develops a superhard skin with superior wearing qualities. Ground shafting or tubing may be hardened without the need for finishing after quenching. The core structure is unchanged and highest ductility is maintained.

Distortion is minimized, regardless of the length of the part, and depth of hardness can readily be controlled by adjusting the input power or varying the travel speed of the part through the heating and quenching coils. Shafting or tubing up to 3 in. diameter of any hardenable steel can be successfully heat treated with a standard 30-kw. Lepel induction heating unit with normal current input.

Mention R-166 When Writing or Using Reader Service.

GRINDING WHEEL

American Emery Wheel Works,
Richmond Square, Providence 1, R. I.

New cylinder-type grinding wheel with hexagon hole or inside diameter, known as the "Hexilinder," has been announced by this company. The wheel, 18x5x2-in. rim, is designed to take heavy cuts with low power consumption because of the unique shearing action of the cutting face. It functions equally well on steel or cast iron, the hexagon inside diameter of the wheel providing for proper distribution of the coolant and thereby reducing to a minimum the grinding heat generated.

Mention R-167 When Writing or Using Reader Service.

PORTABLE HARDNESS TESTING HAMMER

Steel City Testing Laboratory
8843 Livernois, Detroit 4, Mich.

This instrument takes a hardness test right where the material is, instead of taking a specimen to a testing machine. Identified as a portable hardness testing hammer type "P", this self-acting hammer makes repeated tests without readjusting the hammer. If material of a certain degree of hardness is to be selected, it is only necessary to see whether the diameter of the impression made corresponds to the desired degree of hardness. If the impression is smaller or larger, the specimen is either too hard or too soft; this can be checked with microscope and chart supplied.

The hammer consists of a cylindrical housing and easy moving piston; the housing is closed on one end with an inside thread cover, and on the other end with an open bushing. Between the cover and the piston, a strong spring is located which presses the piston against the bushing. The tension of the spring can be adjusted by turning the cover, if the hammer is to be set a certain power of stroke.

The piston is coupled with a striking piston, which projects through the bore of the bushing guided by an airtight fitting ring in the cylinder and carrying a steel ball on the end. Resting the hammer with the ball against the material to be tested and pressing on the operating end, the striking piston and the piston in the housing move inward and press against the spring between the piston and the cover. At a certain point in this movement the coupling between the piston and the striking bolt is released, so that the piston, under pressure of the spring, moves against the inner end of the striking bolt and the ball striking against the material to be tested. After the hammer is released, the striking bolt or piston is brought back to its former position by a spring in the cylinder.

Mention R-168 When Writing or Using Reader Service.

PLATINUM THERMOCOUPLE

Brown Instrument Co., Philadelphia, Pa.

Improvements in platinum thermocouple assemblies used with two-hole silica blocks for glass tank crowns, are announced by this company. The improvements will result, it is said, in longer service life for the protecting tube assembly and will facilitate removal of the thermocouple assembly for periodic inspection.

The major improvements consist of replacing with heat resisting stainless steel the secondary protecting tube previously made of steel. The change will reduce oxidation to a minimum, eliminate freezing of the tube, and permit its removal for inspection.

Mention R-169 When Writing or Using Reader Service.

READER SERVICE COUPON

CHECK THESE NUMBERS FOR PRODUCTION INFORMATION AND MANUFACTURERS' CATALOGS

Use this convenient method to obtain further information on items of interest to you in THE METALS REVIEW. The following numbers refer to the new products, manufacturers' literature and advertisements in this issue.

Check as you read—note the number immediately below the item of interest—mark this coupon and mail for prompt handling.

The Metals Review, August 1945

R148	R156	R164	R172	R180	R188	R196
R149	R157	R165	R173	R181	R189	R197
R150	R158	R166	R174	R182	R190	R198
R151	R159	R167	R175	R183	R191	R199
R152	R160	R168	R176	R184	R192	R200
R153	R161	R169	R177	R185	R193	R201
R154	R162	R170	R178	R186	R194	
R155	R163	R171	R179	R187	R195	

SAVE TIME—GET COMPLETE INFORMATION—CHECK THESE NUMBERS FOR ACTION

YOUR NAME _____

COMPANY _____ TITLE _____

STREET _____ CITY AND ZONE _____

MAIL TO THE METALS REVIEW, 7301 EUCLID AVE., CLEVELAND 3, OHIO

Dr. Greninger Is Appointed Metallurgist For G. E. Chemical Dept. in Pittsfield

A. B. Greninger, who far the past two years has been doing special war work in Chicago, has been appointed metallurgist of General Electric Co.'s chemical department in Pittsfield, Mass.

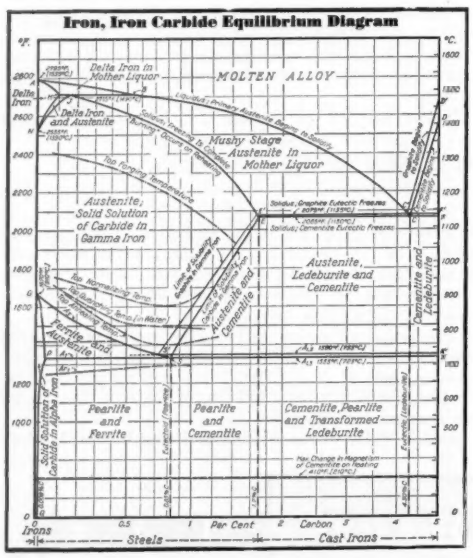
A graduate in mining engineering from Stanford University, he took up advance study in metallurgy at Harvard University Graduate School of Engineering and there earned his Doctor of Science degree in 1935. Until early 1941 he was assistant professor of metallurgy at Harvard and then joined General Electric to do metallurgical work in the company's lamp department in Cleveland. During the latter part of 1943 he was acting manager of the Cleveland Base Works of the company.

Mahoning Valley Has Golf Picnic

Reported by Robert B. Wallace
Metallurgist, Carnegie-Illinois Steel Corp.

In the final meeting of the year, the Mahoning Valley Chapter played host to 160 members and guests at the Mahoning Country Club. In an effort to garner the lucrative prizes offered, part of the assembled group set out to prove that they were golfers as well as businessmen. The turf flew and the sand quaked under the mighty blows that were struck, with golf prizes going to C. Kane, E. N. Hibbert, W. B. Wallace and M. A. Hughes.

Throughout the hot afternoon, refreshments were thoughtfully provided and after a delicious chicken dinner, the new officers were installed.



Only a Few Available
Large Wall Chart of the Iron-Carbon Diagram

While they last, the Iron, Iron Carbide Equilibrium Diagram is available as a large wall chart 40 in. wide by 50 in. deep. This durable chart is backed with strong linen cloth and equipped with top cross-piece and weighted bottom roller and will hang flat against a wall. It will also roll easily and without damage for long, intensive use.

Accurately prepared by the ASM Educational Committee, this wall chart provides the basic iron-carbon equilibrium diagram in a highly legible form that may be used in office or classroom with equal facility. If not in continuous use, a storage tube is provided where the chart may be conveniently placed for safe keeping.

You've seen and used this chart in small size. Now get it in a form that will permit its constant, convenient and reliable use in classroom, laboratory or office. If you are interested in ferrous metals, this chart should be helpful to you. Many have already been put into successful use. A few are still available. Use the coupon now to order this important chart.

Price $10.00 — Published by

American Society for Metals
7301 Euclid Avenue Cleveland 3, Ohio

American Society for Metals
7301 Euclid Avenue
Cleveland 3, Ohio

If still available, send at once the 40"x50" Iron-Carbon Wall Chart, complete with storage tube. I am enclosing check or money order for $10.00 to cover complete cost.

Company Name .....
Street .....
City .....
Signed by .....

Claude Holslag, Founder of Newark Welding Firm, Dies

Claude J. Holslag, president of the Electric Arc Cutting and Welding Co., Newark, N. J., died June 11 at the age of 60. A pioneer in the field of alternating current arc welding, Mr. Holslag was awarded the Samual Wylie Miller Medal by the American Welding Society in 1939 for long and outstanding achievements in welding research. He held several patents for electric welding methods and devices.

He was a graduate of Columbia University and was with the New York Central Railroad before becoming one of the founders of the Newark firm in 1918.

Charles E. Brinker

Charles E. Brinker, a long-time member of the New York Chapter ASM, died suddenly on June 30 at the age of 60. For 18 years he had been a consulting foundry engineer with Whitehead Metal Products Co., Inc., New York.

Richard S. McCaffery

RICHARD S. MCCAFFERY, who died on June 12 in New York City after a long illness, was graduated from the School of Mines of Columbia University in 1896. He was active in the mining and smelting industry in western United States and in South America until 1914, when he became professor of mining and metallurgy at the University of Wisconsin, where he remained until his retirement in 1941.

At Wisconsin he became interested in iron and steel manufacture and was the author of numerous publications on converter steel and on blast furnace and foundry practice. He is best known, perhaps, for his work on blast furnace slags.

Ernest A. McQuarrie

A resolution honoring ERNEST ARCHIE MCQUARRIE, who died on May 16, was drawn up by the members of the Pueblo Group of the Denver Chapter ASM for presentation to the members of his family.

Mr. McQuarrie had been associated with the Robert W. Hunt Co. of Chicago for 35 years and served as chief inspector for that company in the plant of the Colorado Fuel and Iron Corp. in Pueblo for the past 14 years.

M. W. Caruthers

M. W. CARUTHERS, sales manager for Vanadium-Alloys Steel Co. in Springfield, Mass., and a past chairman of the Rhode Island Chapter ASM, was killed recently in an automobile accident.

Elected Vice-President, Engineering For Federal Machine and Welder

J. F. Joy, formerly director of engineering for the Federal Machine and Welder Co., Warren, Ohio, has been elected vice-president in charge of engineering. Mr. Joy previously served the Office of Chief of Ordnance, Army Service Forces, where he received a citation from the War Department for meritorious service "by successfully developing an improved type of high pressure packing which was urgently needed for use with the Field Artillery Material."

J. F. Joy

Inventor of the Joy coal loader, Mr. Joy has headed several prominent companies manufacturing mechanized coal mining equipment. For several years he headed the Joy Engineering Co. of Donugol, Russia, an organization devoted to the modernization of coal mining in that country.

In 1940 Mr. Joy was awarded a silver scroll by the National Association of Manufacturers as "A Modern Pioneer on the Frontier of Industry." He served the Office of Chief of Ordnance from 1940 to 1945.

Thermosetting Plastics Subject of New Film

"Bakelite Plastics—Selecting the Right Thermosetting Molding Material" is the title of Technical Film No. 1 recently issued by the Bakelite Corp. At the same time Technical Film No. 2 is announced on "Product Design and Molding Technique for Thermosetting Plastics."

Both of these films are designed to serve as training films for engineering students and plant personnel. They are available as 16-mm. prints without cost to executives, industrial organizations, engineers, designers, and educational institutions upon request to Technical Film Library, Bakelite Corp., 300 Madison Ave., New York 17, N. Y.

Heads Aluminum Div. Advertising for Reynolds

David F. Beard has been named manager of advertising and public relations for the Aluminum Division of the Reynolds Metals Co., Louisville, Ky. Mr. Beard, prior to joining Reynolds last fall, was with the McGraw-Hill Publishing Co., New York, for 21 years—the last seven years as manager of the direct mail division.

EMPLOYMENT SERVICE BUREAU

Address answers care of A.S.M., 7301 Euclid Ave., Cleveland 3, Ohio, unless otherwise stated.
Applicants for the positions listed below are required to observe the rules and regulations of the War Manpower Commission regarding a Statement of Availability, if employed in an essential activity.

POSITIONS OPEN

METALLURGIST: Familiar with heat treatment and properties carbon, low alloy, high speed steels. Exp. in ferrous metallography. Problem investigation in conjunction sales service work. Good opportunity, permanent. State age, draft status, education, qualifications. Box 8-5.

PRODUCTION MGR.—ERECTOR—ESTIMATOR: Industrial heat treat furnaces. Qualified men with purchase exp. to take charge of production of continuous industrial heat treat furnaces. Also exp. men for erection and cost estimating. Progressive company, East, specializing high quality atmosphere furnaces; expanding business. Excellent postwar prospects. Give full particulars of past exp., salary desired, etc. Box 8-10.

SALES ENGR.: Metallurgical exp. in cast iron to handle sales and service, Detroit area. Production exp. desirable. Permanent. State age, exp., draft status and salary. Vanadium Corp. of America, 2440 Book Tower, Detroit 26, Mich.

LABORATORY TECHNICIAN: New York precious metals company. Mechanically inclined, practical, resourceful man for development work in met. lab. Exp. either silver brazing procedure, powder metallurgy or compounding of alloys helpful but not essential. State education, exp., draft status and salary. Box 8-15.

NON-FERROUS METALLURGIST: Secondary refiners, midwestern region. State education, exp., references and salary. Box 8-20.

OPEN-HEARTH OPERATOR: Secondary non-ferrous refiners, midwestern region. State exp., qualifications, references, wages. Box 8-25.

MECHANICAL ENGR.: About 30; some training in physical metallurgy, for responsible charge of research project. Permanent, good postwar opportunities. Exp. lubrication problems useful. Salary $4000. Write Engineering Experiment Station, University of Tennessee, Knoxville 16, Tenn.

YOUNG MAN: Tech. background; for leading producer stainless steels. Exp. stainless desirable. College degree not necessary but must have general knowledge of metallurgy and metal working processes. Technical writing exp. desirable. Promotional work to handle technical data for publication. Salary open. State qualifications. Box 8-30.

POSITIONS WANTED

GRADUATE METALLURGIST: Specializing in powder metallurgy, desires administrative position with progressive organization in product development and control, marketing, sales coordination or allied fields. Exp. includes ferrous, non-ferrous and precious metals. Box 8-35.

METALLURGIST: 2 yrs. exp. in aircraft metallurgy, failure analysis, process control, steel and aluminum heat treat. B. S. in eng., married, family. Desires definite postwar future, West coast or Gulf coast area. Foreign assignment considered. $300 minimum. Statement of availability. Box 8-40.

PART-TIME CONSULTATION, machine, product or production design, production cost analyses and surveys, metallurgical problems relative to production. Service to be performed at residence. Box 8-45.

METALLURGIST-CHEMIST: Over 20 yrs. exp. all phases fabrication and heat treatment; familiar plant problems. Good executive. Desires complete charge of metallurgical, metallographic and chem. lab., with postwar assurance. Box 8-50.

HEAT TREAT FOREMAN: 8 yrs. exp. practically all phases of heat treating. Enough knowledge met. eng. for contact or sales. Ex-serviceman; will go anywhere. Box 8-55.

CARBIDE EXECUTIVE ENGR.: 17 yrs. exp. sintered and hot pressed tungsten, titanium, carbide cutting, forming tools, wear resisting parts, cast alloys; pricing, cost control. Can set up complete plant and assume full responsibility. Salary open. Box 8-60.

QUALITY CONTROL DIRECTOR: Age 38, mech. eng. background. Exp. foundry, machine and die shop, production and assembly, lab. testing, analysis, inspection. 3 yrs. supervisor quality control large aluminum forging plant. Box 8-65.

METALLURGICAL ENGR. (CONSULTANT): 22 yrs. exp., steel mills, industrial furnace, quality and process control automatic and aircraft engine parts. Desires executive position Northwest Ohio or foreign assignment. Box 8-70.

YOUNG MAN: Foundry and metallurgical background. Preference Chicago location. Excellent training and exp. to offer in return for advancement. Box 8-75.

METALLURGICAL ENGR.: Graduate, exp. ferrous and non-ferrous research and production lab. Exp. heat treatment high speed and alloy tool steel, also familiar chem. and met. lab. work. At present serving with Army Air Force in met. lab., expecting release soon. Would like position with small firm. Box 8-80.

METALLURGIST: University Graduate; 16 yrs. exp. production of special alloys and stainless steels as supt. melt shop and hot rolling mill, production cold-drawn wire and cold rolled strip, research and development on new alloys, precision casting. Desires technical adviser to chief executive smaller metal producing or fabricating company. Box 8-85.

PHYSICAL METALLURGIST: 6 yrs. exp. supervisor of physical testing, metallography, pyrometry, and heat treat trouble shooting. Research ability. Desires similar position in small but growing plant. Age 33. Box 8-90.

METALLURGIST: Young, good sales personality, exp. ferrous metallurgy, production, machining, specifications, heat treatment, metallography. Desires metallurgist or sales engr. with progressive firm with definite postwar advancement. Minimum salary $7,000. Box 8-95.

METALLURGICAL ENGINEER: Age 34; married. M.S. degree; 5 yrs. exp., 3 yrs. supervision. Metallography, heat treatment, physical testing. Radiography, microradiography and some exp. in X-ray diffraction. Desires permanent position in production or fabrication research and control. Midwest preferred. Box 8-100.

RESEACH METALLURGIST: Age 31, B.S. in metallurgy. Knowledge of heat treating carbon, stainless, tool steels, some non-ferrous alloys; exp. bronze foundry practice; welding, soldering; corrosion and field failure analysis; high temperature problems; physical testing; chem. and X-ray analysis; electroplating; steel mill training; consulting work. Calif., Southwest, or South. Box 8-105.

METALLURGIST: B.S. in Chem., Met. and Ceramics, 1938. Exp. spot test lab. tin plate mill; steel foundry practice; centrifugal casting; development and inspection; exp. alloy steel sales. Box 8-110.

METALLURGIST: B.S. physical met. 7 yrs. exp. brass and copper industry, casting, rolling, extruding, drawing and fabricating; also some sales eng. exp. Desires process control and development, non-ferrous. Age 28, draft exempt, married. New England preferred. Box 8-115.

A.S.M. Review of Current Metal Literature — *Continued*

23. INDUSTRIAL USES (*cont.*)

23-177. **Many Special Machines Help Produce Tapered Roller Bearings at Timken.** G. W. Birdsall. *Steel*, v. 117, July 9, '45, pp. 106-110, 112, 164, 166, 168, 170, 172.
Bearing rollers are automatically gaged and grouped for selective fits; outer and inner races gaged by operators on special setups. Unique design, engineering and production features result in a precision famed wherever wheels and shafts must turn easily.

23-178. **Self-Aligning Fastener.** *Steel*, v. 117, July 9, '45, p. 116.
Lightweight, easily and quickly inserted, and can be nested to handle heavy loads.

23-179. **Threads of Stainless Steel.** *Vancoram Review*, v. 4, Spring '45, p. 9.
Provide the ideal non-absorbable surgical suture.

23-180. **Aluminum Qualifies for Postwar Uses.** P. B. Jackson. *SAE Journal*, v. 53, July '45, p. 32.
Available supply of aluminum and its price are important factors influencing its usefulness in postwar markets. They have many characteristics—intrinsic and basic—which individually or collectively produce better products than other available materials.

23-181. **"Battle Tough" Armor Plate at Ford Motor Co.** P. D. Aird. *Modern Industrial Press*, v. 7, June '45, pp. 13-15, 24, 30.
Constant tests of stock insure the quality of toughness, for in addition to the conventional tests for hardness which are applied to every sheet of armor plate that emerges from the press-quenching operation, firing tests are required on every heat. Part of the success due to the heat treating and quenching process. By this method Ford engineers have reduced to two or three minutes process which previously sometimes required hours.

23-182. **Fabricating of the 155 Mm Howitzer at Yuba Manufacturing Company.** Gerald E. Stedman. *Modern Industrial Press*, v. 7, June '45, pp. 18-20, 36.
Details the many improvements in practice that have been developed by Yuba engineers, tool designers and shopmen in the gradual establishment of the present high order of production efficiency. 31 specific changes that have each played their part in man hour reduction.

24. DESIGN

24-56. **Design of Exhaust System, XI.** F. H. Stebbins. *Sheet Metal Worker*, v. 36, June '45, pp. 50-54.
Calculating pipe sizes by the area load method.

24-57. **Some Developments in Modern Transformer Design.** W. W. Satterlee. *Iron & Steel Engineer*, v. 22, June '45, pp. 62-70.
Improvements in the design and construction of transformers have reduced costs and increased reliability. The dry type, air cooled designs offer many advantages and have proven themselves in operation.

24-58. **Magnesium Design Considerations and Applications.** John C. Mathes. *Mechanical Engineering*, v. 67, July '45, pp. 468-472.
Design; sand castings; die castings; bending; application to aircraft.

24-59. **Welded Steel Stampings Provide Innovation in Wheel Design.** *Steel Processing*, v. 31, June '45, pp. 385-386.
Welded wheel composed of stamped steel has been developed for Army tanks. Simple design of the tank bogie wheel from which the truck and trailer wheel evolved is shown.

24-60. **Steel Weldments Offer Freedom of Design.** Harold G. MacGregor. *Production Engineering and Management*, v. 16, July '45, pp. 74-76.
Greater freedom, both in design of new products and redesign of old, is possible for designers who understand weldment as a basic structural tool, rather than an adaptation or substitute for earlier means of joining two or more sections of steel.

24-61. **Production Illustration in Axonometric Projection.** W. Ingham and W. H. Thorn. *Production Engineering and Management*, v. 16, July '45, pp. 101-102, 104-105.
Use of trimetric projection makes illustration not only pleasing to the eye, but mathematically and graphically accurate as well. It removes technical illustration from the realm of supplementary drawing, and enables the engineer to prepare many of his necessary drawings in pictorial form.

24-62. **Revised Process Speeds Production of Mirror-Image Templates.** Thomas A. Dickinson. *Modern Industrial Press*, v. 7, June '45, pp. 33-34, 38.
Great savings in time are now being achieved by means of a revised offset litho process which enables template makers to produce "mirror-image" patterns from master layouts for a single side of an air-frame.

25. MISCELLANEOUS

25-69. **Thin Stock Accurately Marked By High-Speed Equipment.** Donald D. Morton. *American Machinist*, v. 89, June 21, '45, pp. 91-94.
Part numbers are steel stamped to close tolerances for depth by an air-operated machine, which requires only two simple adjustments when a new setup is needed.

25-70. **Perishable Tools on the Firing Line.** W. A. Johnson. *Tool Engineer*, v. 14, May '45, pp. 24-27.
Selection of proper tools for each job assures maximum tool life—pointers on salvaging or reworking worn tools.

25-71. **Demagnetizers—What They Accomplish.** Charles D. Briggs. *Tool & Die Journal*, v. 11, June '45, p. 108.
To rid the work of residual magnetism an external rotating magnetic field "shakes up" the ions. Two methods: (1) A constant d.c. field is rotated mechanically; (2) a strong a.c. field is used. Iron in the presence of an a.c. field presents many problems so a.c. demagnetizers must be specially designed to compensate for hysteresis losses.

25-72. **Dyeing Metal Parts for Identification.** R. P. Cole. *Tool & Die Journal*, v. 11, June '45, pp. 125, 130.
Dyeing of metal surfaces not practical for use on wearing surfaces. Colors intended only for identification during assembly.

25-73. **Fire Safeguards for Magnesium.** Robert S. Moulton. *Aluminum and Magnesium*, v. 1, June '45, pp. 20-21, 24, 28-29.
Magnesium incendiary bombs; fundamentals of fire safety; magnesium dust; machining operations; storage; fire extinguishment; tests by Chicago Fire Department.

25-74. **Metallurgical Research.** *Metal Industry*, v. 66, June 8, '45, p. 361.
Organization by committee or individual effort?

25-75. **Automobile Handling Methods Speed Aircraft Engine Production.** George E. Stringfellow. *Steel*, v. 117, July 2, '45, pp. 104, 107, 112.
Handles interdepartmental movement of parts in unit loads on skids and pallets; moves loads by rail and highway to and from subcontractors without breaking bulk.

25-76. **Keltic Metal Work and Manuscript Illumination.** Douglas Rennie Hudson. *Metallurgia*, v. 32, May '45, pp. 9-13.
Correlation of red dot decoration in manuscript illumination and cloisonne enamelling; the Ardagh chalice; the Shrine of St. Dimma's gospels; Evangelia Quatuor of Lindau.

25-77. **Pointers on Marking Metals and Plastics.** H. O. Bates. *American Machinist*, v. 89, July 5, '45, pp. 126-127.
Marking suitable identification data on machines and equipment is an important manufacturing consideration. Outlines the marking characteristics of different materials and includes a chart on pressure requirements.

25-78. **Technical Research Must Continue to Insure National Security.** R. E. Larkin. *Product Engineering*, v. 16, July '45, pp. 433-437.
Coordinated scientific research for postwar military defense is discussed. Activities of the Wilson and Woodrum committees, and different opinions regarding the form such a program should take, are reported.

25-79. **Color Code for Bar Stock.** Benjamin Melnitsky. *Iron Age*, v. 156, July 12, '45, pp. 56-60.
Differences in plant requirements and practices make impossible the drafting of specific color codes. States the principles of metals grouping and color selection that apply generally. Stamping and other supplementary means of identification also described.

25-80. **Collection and Disposal of Magnesium Dust.** C. C. Hermann. *Foundry*, v. 73, July '45, pp. 90-91, 198, 200, 202.
Dust as produced in machining operations on magnesium castings, dust from grinding, polishing and buffing wheels working on magnesium castings either as a roughing operation in the cleaning room or as a finishing operation in the machining departments, also burring, filing and abrading operations considered.

25-81. **What Do You Think of Research?** G. H. McIntyre. *Enamelist*, v. 22, June '45, pp. 11-13, 46.
Symposium of opinion on science in industry.

25-82. **A Review of Coordinating Research Council Activities.** C. B. Veal. *SAE Journal*, v. 53, July '45, pp. 387-391.
Discussion of CRC outlines topically the content of its activity, touches upon the development of its organization, and illustrates two phases of its work, the formulation of test procedures and the impetus to the development of new products.

25-83. **Patenting An Invention.** Royal R. Rommel. *Wire & Wire Products*, v. 20, July '45, pp. 497-498, 517-518.
Gives to the average individual an outline of the nature of a patent right, and how to secure it.

26. STATISTICS

26-102. **Texas Steel.** Charles T. Post. *Iron Age*, v. 155, June 28, '45, pp. 58-66.
Growing southwestern market gains stability from Sheffield's integrated Houston works as model ore plant alone operates at DPC's frustrated Lone Star project.

26-103. **Domestic Chrome.** *Mining World*, v. 7, June '45, pp. 25-26.
Its abundance in the West may offer new industrial opportunities in the fields of electro-metallurgy and electro-chemistry.

26-104. **Some Problems in Base-Metal Reconversion.** G. C. Bateman. *Canadian Mining and Metallurgical Bulletin*, no. 398, June '45, pp. 362-368.
Problems to be faced in the reconversion period.

26-105. **Magnesium Poses Post-War Problems for United States Government and Industry, Part I.** *Metals*, v. 15, June '45, pp. 5-9.
Demand expected to be far less than in wartime—peacetime consumption placed at 65,000,000 lb. whereas country's productive capacity is estimated at close to 500,000,000 lb.

26-106. **Maintenance of Existing Duties on Metals Needed to Stimulate Industry in Post-War.** Julian D. Conover. *Metals*, v. 15, June '45, pp. 10-12.
Will restore confidence in future and offer incentive for prospecting and developing new mining properties.

26-107. **China Probing for Mineral Resources to Replace Those in Territory Lost to Japs.** Neville Whymant. *Metals*, v. 15, June '45, pp. 13-14.
Country's mineral wealth underestimated—can supply more tungsten, tin and antimony than needed for home use—may become important supplier of mercury to other countries.

26-108. **British Non-Ferrous Metals Control Board Removes Restrictions on Copper and Zinc.** L. H. Tarring. *Metals*, v. 15, June '45, pp. 15-16.
Permits applications for licenses without restrictions as to use to which metals will be put; export orders controlled.

26-109. **Domestic Metal Industry Interested in Subsidy Measure and Tariff Legislation.** *Metals*, v. 15, June '45, pp. 17-21, 26.
Premium price payments on copper, lead and zinc continued for one year; president gets power to cut tariffs by 50%.

26-110. **The Future of the Light Metal Industry in Britain.** D. D. Howat. *Mine & Quarry Engineering*, v. 10, June '45, pp. 133-138.
Production and consumption figures and methods.

26-111. **Wartime Metal Statistics.** *Metal Industry*, v. 66, June 22, '45, pp. 393-394.
Consumption figures for non-ferrous metals, 1942-1945.

26-112. **Raw Materials and Foreign Policies of Nations.** Meherwan Cavasji Irani. *Mines Magazine*, v. 35, May '45, pp. 215-223, 233.
International control of nickel.

26-113. **Preview of Alloy Steels in Postwar Western Industry.** Albert G. Zima. *Western Machinery & Steel World*, v. 36, June '45, pp. 254-257, 280.
Attempt to evaluate the postwar position of these new steels which were sometimes judged as non-uniform or unreliable. Preference was expressed for the NE 8600 and 8700 medium carbon grades for parts not requiring outstanding hardenability.

26-114. **Wartime Aluminum and Magnesium Production.** Hans A. Klagsbrunn. *Industrial & Engineering Chemistry* (Industrial Edition), v. 37, July '45, pp. 608-617.
Alumina production data; alumina production costs at government-owned plants; aluminum ingot facilities and production data for government-owned plants; average of aluminum production costs for nine months; aluminum ingot facilities and production data for privately owned plants; alumina facilities and production data; magnesium metal plants; freight rates on alumina from plants to reduction centers; magnesium facilities and production data; lowest operating costs for electrolytic and ferrosilicon magnesium plants from Dec., 1943, to Oct., 1944.

26-115. **Metals and Fuels: The World Has Enough.** A. B. Parsons. Franklin Institute *Journal*, v. 239, June '45, pp. 437-444.
The notion that the world is going to "run out" of any essential mineral can be refuted. It overlooks significant facts as to the composition of the earth's crust; it ignores the lessons of experience; and it underestimates the imaginative ingenuity and the practical resourcefulness of scientists, of technologists, and of engineers. Geologic processes by which minerals are deposited in the ground are operative today. Metals can be and are salvaged for repeated use.

26-116. **The Postwar Outlook for Steel.** L. S. Hamaker. *Iron & Steel*, v. 18, June '45, pp. 182-185.
Considers the future of steel first in relation to possible competitors such as the light metals and plastics and then in relation to the demand for consumer goods which has piled up during the war—for houses, railways, agricultural implements, highways and the prospects in the export markets. Foresees Great Britain and the United States having between them to supply "an enormously expanded world demand for steel."

26-117. **The Future of Base Metals.** Edgar Pam. *Engineering*, v. 159, May 25, '45, p. 416.
Considers steps possible to increase production.

27. NEW BOOKS

27-109. **Chemistry of Coal Utilization; 2 v.** Prepared by the Committee on Chemical Utilization of Coal, Division of Chemistry and Chemical Technology, National Research Council. 2078 pp., bibl., illus., diagrs. John Wiley & Sons, 440 Fourth Ave., New York 16, N. Y. $20.00.
A critical review of the world's literature on the origin and classification of coal, its physical properties and chemical nature and the chemistry of coal carbonization, combustion, gasification and hydrogenation. The chapters are written by experts in the various fields.

27-110. **Training for Supervision in Industry.** George H. Fern. 188 pp., McGraw-Hill Book Co., 330 West 42nd St., New York 18, N. Y. $2.00.
An understandable treatment for those concerned with the problems of training men for supervisory positions. Explains the conference method and deals specifically with such problems as maintaining mental health in industry, handling problems of women workers, promoting safety, training new workers.

27-111. **Staffordshire Iron and Steel Institute** *Proceedings*, v. 61 and 62, edited by H. A. MacColl. Mark & Moody Ltd., 52 and 53 High St., Stourbridge, England.
Papers and proceedings of 1940, 1941 and 1942 sessions, including Presidential Addresses; Steel for Sheets, by H. J. Merchant: and Some Practical Aspects of the Manufacture of Producer Gas, by E. Wood.

A. F. Davis Welding Library at O.S.U. Contains More Than 1000 Volumes

To assemble in one place all the important literature on welding is the objective of the A. F. Davis Welding Library at Ohio State University in Columbus. Established in 1942, the Library already contains more than 1,000 books on all pertinent subjects, and includes welding handbooks, welding magazines, the original award studies of the James F. Lincoln Arc Welding Foundation, patents relating to welding, and many other subjects.

The Library is named for its donor, A. F. Davis, vice-president and secretary of the Lincoln Electric Co., Cleveland. It is located at Ohio State University, the only university offering a four-year course in welding engineering. Assistance of industry in extending its collection is invited and visitors to the Library are welcomed.

NEW PRODUCTS IN REVIEW

NON-CONTAMINATING MORTARS

New England Carbide Tool Co.,
60 Brookline St., Cambridge 39, Mass.

New contributions in the chemical field are mortars and pestles which cannot become contaminated. The mortar is constructed with a steel body and is lined with a boron carbide insert which is ground to the proper shape and then polished to a mirror finish. The pestle has a steel handle with a polished boron carbide rod mounted at the working end.

Boron carbide is the hardest commercial material ever made by man. It cannot charge, and, therefore, it will not pick up lint, dust, or metal particles which might contaminate the materials being ground. The mirror surfaces are so smooth that pit marks or surface irregularities are eliminated, and both the mortar and pestle can be made sterile clean after use.

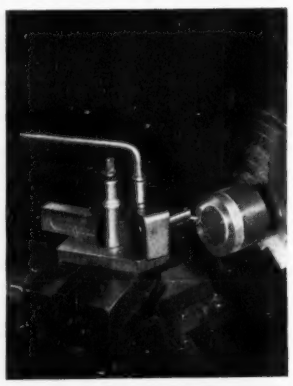
These mortars and pestles have been used in large scientific research laboratories for over six months with absolutely no signs of wear or contamination.

Mention R-170 When Writing or Using Reader Service.

TOOL HOLDER

Lane-Wells Co.,
5668 S. Soto St., Los Angeles 11, Cal.

Designed to speed engine lathe production operations when a series of identical cuts are to be made, the Lane-Wells type "L" universal toolholder consists of a body which fits into the lathe tool post in the conventional manner and detachable heads which hold standard high speed or carbide tipped tool bits. These compact, sturdy attachments are made in four sizes to fit any engine lathe from 9 to 36 in. swing. Once the body is fastened in the tool post and the bits adjusted in the detachable heads, it requires less than 3 sec. to change from one tool to another. No machining is necessary to make the attachment fit a lathe and it can be moved from one lathe to another in the shop. Eleven different standard heads are available for boring, turning, facing, forming, drilling, reaming, tapping, etc.



Mention R-171 When Writing or Using Reader Service.

ARC WELDING ELECTRODE FOR LOW ALLOY, HIGH TENSILE STEELS

General Electric Co., Schenectady, N. Y.

A new heavily covered arc welding electrode for welding low alloy, high tensile steels is specially designed for use on carbon-molybdenum steel in the high pressure piping industry. It may also be applied to vessels (fittings) and structural weldments of innumerable kinds.

Known as Type W-56, the new electrode operates satisfactorily on either alternating current, or direct current, reverse polarity, and its range of current is sufficiently broad to cover a wide range of plate thicknesses. A medium-long arc is recommended for best results with this electrode. It can be used in the flat, vertical, and overhead positions. Moreover, it produces a relatively flat deposit, particularly in the vertical position.

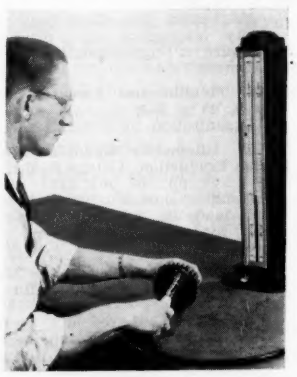
Features of the new electrode include a stable spray-type arc, deep penetration, and excellent creep resisting qualities. In addition, the covering used produces an easily removed, light, friable slag, which sets up fast, thus facilitating proper manipulation of the electrode. Available in sizes ⅛, 5/32, and 3/16 in. in diameter, the new electrode meets the requirements of AWS Classes E7010 and E7011 and complies with the Navy Bureau of Ships specifications 46E2.

Mention R-172 When Writing or Using Reader Service.

AIR GAGING SYSTEM

Federal Products Corp., Providence, R. I.

This company is exclusive sales agent for a new air gaging system manufactured by Metrical Laboratories, Inc., Ann Arbor, Mich., known as Federal Metricator System of dimensional gaging by air. This system consists of a graduated column and a gaging head. A manometer tube, built into the water column, indicates variations in the air pressure.



The standard gaging head is constructed with two measuring orifices which are recessed with respect to the outer skirt of the gaging member. This recessed construction of the orifices of the gaging head permits a part whose surface is easily marred to be precisely gaged without the surface of the part actually touching the gaging member. This recessed design of the gaging head contributes to the maintenance of operating accuracy, due to the fact that the protective outer skirt of the gaging member can wear considerably before the two measuring orifices themselves show signs of wear.

As the space between the measuring orifices and the part being gaged increases, the air flow increases and the water column rises in the manometer tube. This results in a plus reading when gaging a hole diameter. If the diameter of the hole being gaged is undersize, the air flow is decreased, and this is expressed by a minus reading on the scale.

The metricator scale is calibrated to a high degree of accuracy, and it does not require high or low limit gages, only one master being required for each gaging head. When this master (which is a regular part of the Federal metricator air gaging system) is applied to the gaging head, the scale reads at zero. The master is made from high grade chromium plated tool steel and lapped to the highest possible standards of dimensional accuracy.

By building a reduced size measuring orifice, holes as small as 0.156 in. diameter and shoulders as narrow as 0.0937 in. can be precisely measured. Slots and grooves can be gaged from 0.0937 in. thick and up. Gaging heads in general will measure external diameters from 0.500 in. diameter up.

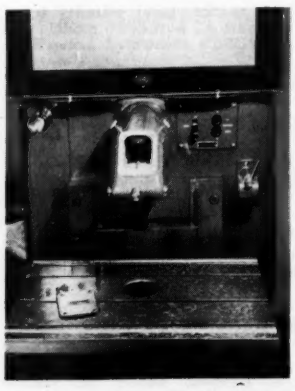
Amplification is four thousand to one, which means that measurements within 0.000025 in. are easily readable on the scale. One ten thousandth of an inch is represented by approximately ½ in. on the scale. Practically any inside dimension down to ⅛ in. diameter and any outside dimension down to ¼ in. diameter and other dimensions of depth and width, can be gaged singly or together.

Mention R-173 When Writing or Using Reader Service.

CONTOUR MEASURING PROJECTOR

Bausch & Lomb Optical Co., Rochester, N. Y.

A 26% brighter screen image results from production changes recently made in this contour measuring projector. An anti-reflection coating applied to condenser lenses increases the screen illumination.



Roof prisms of the B & L projector are now silvered to give them permanent reflecting surfaces. Over a period of time, thin films of oil and dust present in factory air cause the efficiency of unsilvered prisms to drop slightly, but silvering makes it impossible for dust or oil to change the reflectance value.

From a practical standpoint, the net gain in efficiency will be even greater than 26% when the effect of deterioration of unsilvered prisms with time is taken into consideration.

Unsilvered reflecting prisms lose their efficiency not only through collecting films and dust, dirt, and oil, but through attempts of careless workers to clean them. Operators are apt to use the handiest cloth available for this purpose, and this cloth may be covered with grit or grease or some other substance destructive to optically polished surfaces.

The anti-reflection coating used on the condenser lenses is of the evaporated film type developed by Bausch & Lomb to increase the light transmission of binoculars, telescopes, and photo lenses.

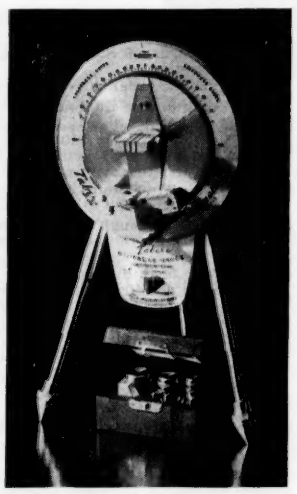
Mention R-174 When Writing or Using Reader Service.

STIFFNESS GAGE

Taber Instrument Corp.
111 Goundry St., North Tonawanda, N. Y.

This is a new Taber V-5 power driven stiffness gage for determining standard measurements of the stiffness and resilient qualities of flexible materials up to ⅛ in. in thickness, such as laminated plastic, cardboard, light metal sheet and wire.

The new instrument without the addition of attachments will measure both initial and normal stiffness characteristics; elastic drift or "creep" of the specimen structure can also be charted from the various readings.



The calibrated weighing system is of the pendulum type, considered one of the most responsive and accurate means of measuring small increments of load. The entire pendulum assembly with the exception of the calibration weight is made of strong aluminum alloy, keeping inertia and bearing friction to a minimum. The face of the specimen clamp is mounted exactly on the center of rotation insuring constant test length of the specimen.

A set of calibrated weights is furnished with the instrument consisting of one each calibrated in 500, 1000, and 2000 stiffness units. Weights of 3000 and 5000 stiffness units are also available.

For measuring the flexural strength of very thin and flexible materials below 10 units stiffness an attachment is provided that eliminates mechanical friction and inertia.

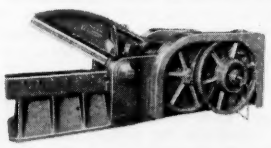
The instrument is portable, weighing only 15 lb., and can be plugged into any 115-volt, 60-cycle circuit in the laboratory or plant. Its simplicity of operation and quick direct readings make it easy to use even by those without previous technical experience. Complete information is available in Bulletin 4506.

Mention R-175 When Writing or Using Reader Service.

AIR OPERATED CLUTCH ON ALLIGATOR SHEARS

The Hill Acme Company, Canton Division,
6400 Breakwater Ave., N.W., Cleveland 2, Ohio

Installation of the new air-operated stop motion clutch on "Canton" alligator shears results in greater safety and more accurate cutting. By tripping a hand or foot lever, the shear makes one cut and stops with the jaws open, giving the operator perfect control with safety. Continuous jaw operation may be obtained by a simple instantaneous adjustment.



This new, silent operating clutch, which requires air pressure of only 70 lb., eliminates practically all wearing parts except the clutch face and insures years of trouble-free operation. It can be installed on any shear in the present alligator shear line.

Mention R-176 When Writing or Using Reader Service.

ELECTROLYTIC DEGREASING AND CLEANING

W. D. MacDermid Chemical Co., Bristol, Conn.

Ferrodex, an electrolytic compound, is described in a four-page leaflet as an electrolytic cleaner to reduce processing time in a manually operated cleaning cycle, through its rapidity in producing a chemically and physically clean surface. It saves time through the elimination of pre-cleaning, soaking, or hand cleaning, so often necessary. The compound has the unusual properties of brightening surfaces, which in turn will require a shorter acid treatment at lower concentrations following the Ferrodex solution.

Mention R-177 When Writing or Using Reader Service.

COILED STRIP

Agaloy Tubing Co., 1027 Newark Ave., Elizabeth 3, N. J.

A method said to be entirely new in the tubing industry has been devised which stretches strip in a longitudinal direction during coiling operations. The result is a strong tubular structure without welding or brazing.

This new development is devoted to coiling cold rolled strip into tubular forms, such as spirally coiled tube with inside or outside fins; edges overlapped with the protrusions either inside or outside; open seamed coils to accurate dimensions, etc. Such tubular forms, however, are not suitable for pressure applications or for liquids.

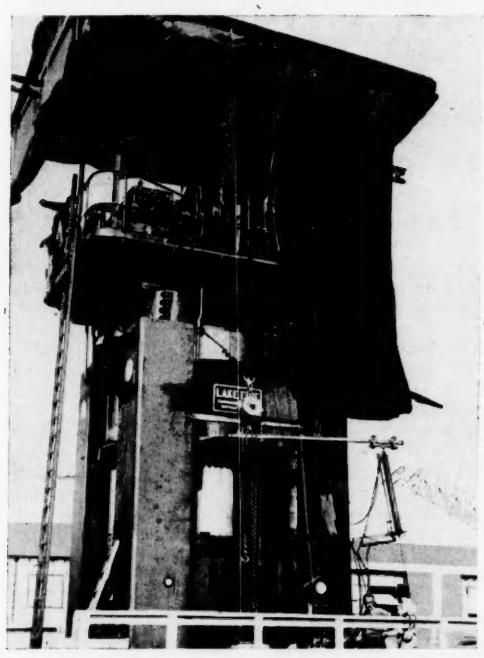
Mention R-178 When Writing or Using Reader Service.

NEW PRODUCTS IN REVIEW

6000-TON HYDRAULIC PRESS

Lake Erie Engineering Corp., Buffalo, N. Y.

With a total weight on the foundation of a million pounds and a capacity of 12,000,000 lb., this industrial giant was installed by the Norris Stamping and Mfg. Co. at Los Angeles in record time. Much too large to set up in its present buildings, the press was located in a lot adjacent to one of its buildings and put to work stamping out ordnance work. When placed in service the press was



covered with a temporary protective tarpaulin covering, while a suitable factory was being built around it.

The bottom platen weighs 160,000 lb., the moving platen, 140,000 lb., top cylinder, 215,000 lb.; four columns, each 22 in. in diameter by 34 ft. long, weigh 12,000 lb. each. The main ram weighs 44,000 lb. and the four guards each weigh 3,000 lb. The four columns are really enormous studs, threaded on each end for super nuts, which were adjusted to within 0.005 in. before the press was put in operation. The height of the press above ground level is 32 ft., and it extends 11 ft. below ground to the foundation.

Mention R-179 When Writing or Using Reader Service.

METAL FINISHES AND SERVICES

Technic, Inc., 39 Snow St., Providence, R. I.

Technic, Inc. was recently organized by the staff which for years produced and serviced a line of metal finishes and services. Capacity includes a complete metal finishing service covering consulting, analytical, research and engineering work, as well as specification testing, plating room design and salt spray testing.

Products include: Trushade 24K Soluble Gold (aqueous), White Brass, Antique Smuts, Black Finishes for Brass, Copper and Silver, Soluble Hard Gold Alloy (aqueous), 14K Soluble Gold Alloy (aqueous), Flame Flux, Wetting Agents, Pink Soluble Gold Alloys, Soluble Green Gold Alloy, Immersion Tin, Gold Strip, Aluminum Pre-plate, and Protectox (invisible oxide).

Mention R-180 When Writing or Using Reader Service.

DUPLEX SEAM WELDER

Progressive Welder Co.,
3050 E. Outer Drive, Detroit 12, Mich.

Duplex seam welders have now been designed for simultaneous seam welding of two or more parallel seams on one surface. Originally engineered and produced by Progressive for lower cost, rapid fabrication of sheet steel ammunition boxes for the Ordnance Department, these new resistance welding machines offer definite economies for many similar types of fabricating operations.

The machines, available in a wide range of capacities and sizes, are air operated and fully automatic. A duplex head on the machine accommodates either two or four welding wheels.

The work itself is carried on a work table mounted on horizontal slide rails. The top of the work holding fixture is formed by a flat copper plate which provides the lower path for the welding current between the welding wheels. Thus, the platen top becomes the lower electrode for both wheels. Welding wheels, lower electrodes, welding transformer, etc. are all water cooled. A deep coolant trough is integral with the moving work table.

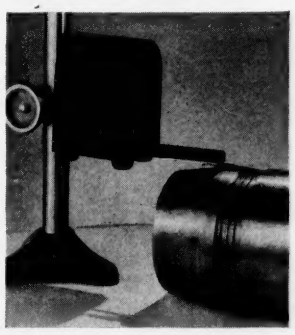
The entire assembly—bearing the work to be welded—moves in and out of the machine as the welding operation proceeds. Operation of the movable table is by air cylinder connected with hydraulic cylinders acting as dash pots to insure uniformly smooth table travel. Speed of the work table—and therefore the feed of the work—has a wide stepless adjustment range of from 0 to 30 in. per min. at usual factory air line pressures.

Mention R-181 When Writing or Using Reader Service.

ROUGH-FINISH MEASURING HEAD

The Brush Development Co., Cleveland, Ohio

This new rough-finish measuring head will meet the need for checking the rougher surface finishes and waviness in metals, glass, plastics, plated and painted materials.



With the trend toward more rigid specifications and tolerances, particularly on turned surfaces, the new rough-surface analyzer makes a perfect complement for the original Brush surface analyzer.

The new pickup and drive head accurately measures irregularities from 100 to 3,000 micro-inches, peak to valley. It thus extends the use and range of the Brush surface analyzer from 1 to 3,000 micro-inches.

Mention R-182 When Writing or Using Reader Service.

IRIDITE FINISH PROTECTS GALVANIZING

Rheem Research Products, Inc.,
Standard Oil Building, St. Paul & Franklin Sts.,
Baltimore 2, Md.

Greater resistance to white corrosion for galvanized products is now made possible through the special development of Iridite Galvon.

Like its predecessor, Iridite olive drab for zinc and cadmium plated parts, Iridite Galvon is applied by simple dipping at normal room temperatures. No special equipment or personnel is needed; no electric current is used. The basic coating is susceptible to various dye colors.

Accelerated corrosion tests conducted by the company under U. S. Bureau of Standards Salt Spray Specifications indicated no signs of white corrosion products on hot dip galvanized panels after 236 hr. Iridite Galvon can be applied either to complete assemblies, parts, or to galvanized sheet previous to fabrication.

Mention R-183 When Writing or Using Reader Service.

SALT BATH FURNACE

The Bellis Heat Treating Co., Branford, Conn.

This four-pot electric salt bath furnace has an improved roll-back cover, which, with adjustable water cooled electrodes, makes a very efficient and flexible laboratory or tool shop installation for establishing isothermal practices and production heat treating.

In the first bath is No. 40 Lavite for bright tempering and martempering; No. 130 Lavite is in the second bath for tool steel hardening and preheating high speed steels; Triple A Lavite is in the third bath for austenitizing temperatures up to 2300° F. and No. 90 Lavite is in the fourth bath for high speed quenching and tempering.

The No. 40 Lavite in the first bath is a chloride bath with 350° F. melting point. It gives bright tempering,

bright quenching or preheating and is also for interrupted quenching, martempering and austempering.

The hardening Lavite No. 130 in the second bath is for heat treating intricate shapes, where minimum warpage is important and for preheating high speed steel. Melting point is 1300° F., and maximum temperature is 2000° F. Specific gravity is 10 to 20% lower than other grades.

The Triple A Lavite is for hardening high speed steel tools. Temperature range is from 1750 to 2400° F. and it gives fine finish to high speed steel after long heating at high temperature. Whether oil, air or Lavite quenched, the film of Triple A washes off easily. An important feature is that moly and the standard high speed steels may be heated to high temperatures for long times without the surface being affected.

The No. 90 Lavite is for bright tempering at high temperatures and has a melting point of 850° F. This eliminates the use of nitrates and gives a neutral bath with working range of 850 to 1350° F. for quenching and tempering high speed steel.

Mention R-184 When Writing or Using Reader Service.

NEW ELECTRIC-TYPE POTENTIOMETER CONTROLLER SERIES

The Bristol Co., Waterbury 91, Conn.

A new series of electric-type potentiometer controllers includes five basic control unit types. Three are electric contact types to be known as the Microact controllers and the other two are electric proportioning and current input types. The control units are mounted on the internal panel of the Pyromaster potentiometer recorder and any type may be readily converted to any other type by following simple wiring and mounting instructions.

The three Microact units are provided with one, two, and three precision-type toggle switches respectively and six different terminal board connection arrangements to meet a wide assortment of control circuit requirements.

Proportioning controllers may be used with any type of electric proportioning valve and may be had with resetting contacts if required. The proportional current input controller is primarily designed to provide close temperature control of electric furnaces and ovens.

The complete line is fully described with photographs, diagrams, and load wiring circuits in a new Bulletin PB1226 available from the manufacturer.

Mention R-185 When Writing or Using Reader Service.

METRIC GAGE BLOCKS

DoAll Co.,
1301 Washington Avenue, S., Minneapolis 4, Minn.

The makers of DoAll precision gage blocks and instruments announce a new series of metric gage blocks designed to fill the needs of domestic and foreign manufacturers working in the metric system. These blocks are offered in two grades that correspond in accuracy with the English system. Inspection quality is guaranteed accurate within ± 0.0001 mm. and working quality guaranteed accurate within ± 0.0002 mm. accuracy.

To plants working in the metric system, either in full production or special contracts, this set of precision gage blocks will save considerable time and insure required accuracy. The standard policy of converting English measurement to metric can be eliminated entirely with the wide range of measuring combinations possible. Calibrated in the metric system, the blocks can also be used to make up English system combinations.

The set consists of 38 blocks plus 2 wear blocks (of tungsten carbide in the inspection grade) and is capable of producing over 100,000 combinations ranging from 1.01 mm. to 100 mm. in increments of 0.01 mm. A special 1.005-mm. block in the set makes possible special combinations for closer tolerances where needed. Manufactured from high carbon chromium steel, the blocks are guaranteed to exceed a hardness of Rockwell C-65. A special aging process using alternate heating and freezing to —120° F. gives the blocks unusual stability, while exceptional wearing quality is possible because of the extremely fine surface finish, less than 0.4 micro-in. RMS in the inspection grade.

Precision gage instruments to greatly increase the application of the gage blocks are also available in the metric system. Illustrated information on the set or instruments is available.

Mention R-186 When Writing or Using Reader Service.

NEW MACHINABLE CAST IRON WELDING ROD

Alloy Rods Co., York, Pa.

A new machinable cast iron welding rod has been added to the line of Arcaloy stainless steel and Tool-Arc tool steel electrodes. The new rod introduces to the cast iron welding field an entirely new electrode—Nickel-Arc. Nickel-Arc may be used with perfect ease on a.c. or d.c. current in all positions. No preheat is required to obtain porosity-free deposits completely machinable in the weld deposit fusion zone. The weld deposit is free from cracks or cross checking in multiple pass welds and after machining or grinding the weld deposit closely matches the color of the parent cast iron. The sound, homogeneous weld deposits also withstand hydrostatic pressure.

Mention R-187 When Writing or Using Reader Service.

ELECTRODE FOR WELDING JET ENGINES

Arcos Corp., 1515 Locust St., Philadelphia 2, Pa.

A new electrode for welding the metals developed for jet propulsion engines is announced. The electrode produces a weld metal that withstands the great temperatures and stresses encountered in jet propulsion engines.

Although the chemistry and physical properties of this new weld metal cannot be revealed publicly, Arcos Corp. is prepared to supply this electrode for those manufacturers engaged in this program.

Mention R-188 When Writing or Using Reader Service.

MANUFACTURERS' CATALOGS IN REVIEW

Home Study Course

The DoAll Co.,
1301 Washington Ave., S., Minneapolis 4, Minn.

Another new educational feature announced by DoAll is a correspondence course titled "Science of Measurement." This group of eight lessons for industrial and vocational gage training programs is designed to promote a wider knowledge of precision measurement, thus aiding industry in cutting costs and increasing production.

The lessons amply illustrate the care and use of gage blocks, and many concrete examples are given along with photographs showing how their use may be expanded. How they may be utilized as direct working gages in conjunction with gage holders and instruments is also shown.

Hundreds of photographs show inspection and engineering methods utilizing height gages, locating gages, go, no-go gages, inside and outside micrometers, lead screw measuring gages, scribers, dividers, and the new mobile inspection unit. Tables and formulas make simple such problems as measuring pitch diameter of screws, splines, and helical gears by the three wire method, and measuring of angles, bevels and tapers by use of the sine bar. A full booklet is devoted to the Comparator, showing the complete versatility of this instrument as a machine and its endless inspection possibilities when used with fixtures.

The whole eight lessons are spaced to cover a two months' period. Mailings are made direct to the homes of inspection personnel on the basis of one lesson each week.

Mention R-189 When Writing or Using Reader Service.

Pressure Chart for Steel Tubing

Baker Steel and Tube Co., Los Angeles, Calif.

This diagram is designed to show a safe working pressure for round steel tubes with outside diameter up to 10 in., wall thickness from 0.035 to 1 in., ultimate tensile strength of steel from 40,000 to 100,000 psi., and safety factors from 2 to 6.

The diagram was primarily designed for low carbon, soft annealed steel having ultimate tensile strength of 48,000 psi and for this reason it permits a direct reading on the lower scale of ultimate pressure for any tube size of this steel by going from the outside diameter scale horizontally to the wall thickness curve, thence vertically down to the ultimate pressure scale. By stopping at the desired safety factor line and returning to the left vertical scale, the safe allowable pressure may be read on this scale for steel of 48,000 psi.

In order to make the chart usable for steels having other strength characteristics, another set of radiating straight lines were introduced designated as 40,000 up to 100,000 psi. ultimate tensile strength. By returning horizontally to the proper steel line, thence vertically to the scale, the allowable pressure may be read for the steel and tube in question.

An example is worked out on the chart, the arrows indicating the procedure to follow.

Mention R-190 When Writing or Using Reader Service.

Reference Chart on Alloy Welding

Arcos Corp., 1515 Locust St., Philadelphia 2, Pa.

This company has just announced a completely new and simplified reference chart on high and low alloy welding electrodes. The data are grouped for quick, easy use and include weld metal chemical analyses, information on corrosion resistance, on heat resistance, and on weld metal surfacing. The chart also includes welding currents and voltages and stub end color table.

Mention R-191 When Writing or Using Reader Service.

Magnetic Ingot Iron Book

The American Rolling Mill Co., Middletown, Ohio

Special advantages of "Armco Magnetic Ingot Iron" which make it especially suitable for d.c. applications are presented in a new 24-page booklet.

The booklet describes Armco magnetic ingot iron as a dense, highly refined open-hearth iron with high conducting power. For this reason, the manufacturers say, it is ideal for many electrical and magnetic applications. Products in which this special iron is used to advantage range from magnetic cores for cyclotrons to telephone and telegraph wires for communication systems. It is also a good conductor of current in various kinds of electrical transportation equipment.

"How to Fabricate Magnetic Ingot Iron" is the title of one section. It contains data on the effect of strains on magnetic properties; hot and cold working; machining operations with the aid of standard tools; and accepted methods of welding, including tables on the best electrodes to use.

Mention R-192 When Writing or Using Reader Service.

House Organ Resumes

James H. Knapp Co., Inc.,
4920 Loma Vista Ave., Los Angeles 11, Calif.

The Knappsack, house organ of this manufacturer of industrial furnaces, has resumed publication afer having been suspended as a wartime measure.

The publication which, previously, had a wide circulation among heat treating engineers and others in the metals business, is "full of industrial furnace information," as its slogan says. Editorially it recognizes the wartime achievements of Knapp furnace users, and invites heat treating engineers to utilize its column headed "Experience Swap Shop."

Mention R-193 When Writing or Using Reader Service.

Airless Wheelabrator Tables

American Foundry Equipment Co.,
555 S. Byrkit St., Mishawaka, Ind.

Just published are five individual catalogs on the complete line of airless Wheelabrator tables, both multirotary table and plain table types. The multi-table machines are supplied in sizes ranging from 12 8-in. diameter tables to four 66-in. diameter tables. Plain table machines are supplied with 6 to 12-ft. tables. A catalog on the size machine suited to individual requirements will be mailed postpaid upon request.

Mention R-194 When Writing or Using Reader Service.

New Technical Data Chart

Peter A. Frasse & Co., Inc.,
17 Grand St., New York 13, N. Y.

"Recommended Heat Treatment of Alloy Steels" is the title of this newly released Data Chart No. D-3, which gives a comprehensive analysis of heat treating procedures for standard SAE and AISI grades, including the NE types. The chart summarizes, for easy reference, the proper annealing, normalizing, hardening, reheating and drawing temperatures with recommended practice shown for each alloy analysis. It is printed on tough card stock, handily tabbed for reference filing.

Mention R-195 When Writing or Using Reader Service.

Plant Expansion

Robert H. Clark Co.,
9330 Santa Monica Blvd., Beverly Hills, Calif.

A new plant addition with an area of 10,000 sq. ft. will provide facilities for increasing the production of Clark cutting tools and Clark adjustable tool holders. It will house additional machinery and equipment and allow for the construction and operation of a new continuous type of production and assembly.

The new 1945 catalog giving a complete description of the adjustable cutting tools manufactured by this company, including the new Clark adjustable tool holder, is now available.

Mention R-196 When Writing or Using Reader Service.

Pocket Manual on Rivets

Cherry Rivet Co.,
231 Winston St., Los Angeles 13, Calif.

A new 20-page pocket manual, D-45, giving at a glance a general picture of what Cherry rivets are and can do, is fully illustrated in three colors, and covers the several basic types, their installation methods and applications.

Self-plugging and hollow Cherry rivets in various styles, sizes and alloys are described in detail. Of particular interest is the comparison between "blind riveting" and "pull riveting." Typical applications in such materials as sheet metal, fabric, plywood, plastic, rubber, leather and enamels are listed.

A section titled "A Cherry Rivet for Every Job" lists 20 types of Cherry rivets designed for a variety of materials and uses. Application guns G-15RB pneumatic, and the hand guns, G-10, G-25, G-35 and G-20 are described and illustrated, with angle adapters, flat face nippers and Cherry rivet kits.

Mention R-197 When Writing or Using Reader Service.

Permanent Mold Castings

The Permold Co., Medina, Ohio

Reference Data Bulletin PMC 45 has been written to provide design engineers, production executives and metallurgists with reliable information on permanent mold castings.

This 20-page two-color review points out advantages obtainable with aluminum castings in cost, design and strength. Suggestions are offered to facilitate the designing of parts for the permanent mold casting process.

The booklet includes four tables which give the nominal composition and physical properties of Permold aluminum base alloys and the nominal composition and physical properties of Permold aluminum base sand cast alloys. Various applications of permanent mold castings are illustrated by clear-cut photographs.

Mention R-198 When Writing or Using Reader Service.

Non-Magnetic Uses of Manganese Steel

American Manganese Steel Division of
American Brake Shoe Co.,
Chicago Heights, Ill.

"Non-Magnetic Applications for Amsco Manganese Steel" is the title of this comprehensive 32-page illustrated bulletin.

Austenitic manganese steel has been widely adopted by industry during the past half-century for applications where high resistance to impact and abrasive wear is required. Important, but given less recognition until recent years, is the non-magnetic property of manganese steel. Ordinarily, non-ferrous metals are adequate for such applications, but in an increasing number of cases the qualities of impact or abrasion resistance, or both, are essential for certain equipment parts requiring non-magnetism as well. In such cases the low strength, added to the high cost, of copper, brass, bronze and other non-ferrous alloys makes them unsuitable, especially in the form of castings.

Austenitic manganese steel is an inexpensive but very strong and tough material for castings which must be substantially non-magnetic. Its permeability is so low that the attraction by a magnet is minute and generally is not detectable.

Presented in this bulletin are studies with illustrations of typical applications where non-magnetism and the ability to withstand shock and wear were equally vital factors in the selection of manganese steel. These applications include lifting-magnet cover plates, collector shoes, fingers for stator cores, magnetic separator drums and rollers, electric furnace parts, aircraft instrument testing devices and a number of railroad applications. These studies may point the way to the solution of many problems. The story of manganese steel and the company's research facilities are also covered in Bulletin 1144-NM.

Mention R-199 When Writing or Using Reader Service.

Surface Grinding

George Scherr Co., Inc.,
200 Lafayette St., New York 12, N. Y.

A new eight-page folder, entitled "Speed Surface Grinding Set-ups," is profusely illustrated with actual applications of Magne-Blox products employed to hold various types of work for surface grinding operations which may aid in solving holding problems that are constantly coming up in the grinding department.

Featured also is a new service, the production of special sizes of Magne-Blox parallels, V-blocks and angle irons, as well as other shapes and forms to fit any type of magnetic chuck.

Mention R-200 When Writing or Using Reader Service.

Magnetic Pulley Catalog

Dings Magnetic Separator Co.,
509 E. Smith St., Milwaukee, Wis.

This new 32-page catalog describes electromagnetic pulleys and pulley type separators. Uses of magnetic pulleys in paper mills, textile mills, foundries, and many other industries are listed, along with tables, capacities, and dimensions. Specifications of Dings air-cooled magnetic pulleys are fully covered and installation photographs are liberally used. In addition to data on pulleys, the catalog shows other classes of magnetic equipment.

Mention R-201 When Writing or Using Reader Service.

The Metals REVIEW
THE MONTHLY SURVEY AND DIGEST OF WHAT'S NEW IN METALS

Index to Advertisers

	Page
American Brake Shoe Co.	11
Buehler, Ltd.	7
Chace Co., W. M.	9
DoAll Co.	12
Electric Furnace Co.	10
Electro-Alloys Div., American Brake Shoe Co.	11
Hevi Duty Electric Co.	11
Kemp Mfg. Co., C. M.	10
Lindberg Engineering Co.	7
MacDermid, Inc.	3
Paragon Spring Co.	5
Perfection Tool and Metal Heat Treating Co.	11
Rustless Iron and Steel Corp.	3
Ryerson & Son, Inc., Joseph T.	5
Tinnerman Products, Inc.	5
Waltz Furnace Co.	11

A. P. Ford, Advertising Mgr.
7301 Euclid Ave., Cleveland 3

Robt. S. Muller, Eastern Rep., Don Harway, West Coast Rep.,
55 West 42nd St., New York 18 816 West 5th St., Los Angeles 13

5

V

ese
us-

ed
ns
re-
ent
el.
ch
he
are
on-
ed
on-
he

ery
be
hat
is

ons
oil-
ors
ons
ers
rs,
ces
ay
The
rch

e.

ace
ual
old
ons
on-

pe-
gle
ype

ce.

etic
oul-
any
ies,
ag-
oto-
eys,
t.
ce.

age
11
7
9
12
10
11
.11
10
7
3
5
11
3
5
5
11

Rep.,
es 13